- Methods of applying coatings
- Crossett's five-cylinder machine
- Xatron drives for pulp and paper
- Simple system of inventory

The Paper Industry

Publishers of PAPER AND PULP MILL CATALOGUE

TECHNOLOGY DEPT.

OF EVAPORATOR CAPACITY PER HOUR!

JUN 21 1956
DETROIT

SEVEN IN A ROW . . . A pound of steam that enters these septuple effect Swenson Evaporators at Longview Fibre removes up to six pounds of water from spent cooking liquors.

Lower operating costs through increased evaporator steam economy! That is the story at Longview Fibre Company, Longview, Washington, since Swenson Evaporators were installed. The two septuple effect evaporators provide capacity to evaporate one-half million pounds of water per hour!

The Longview economy story is not new to Swenson. Ninety per cent of the septuple effect evaporators in use today were engineered by Swenson. Put Swenson's engineering know-how and experience to work in your plant. Call a Swenson engineer . . . now.

SWENSON EVAPORATOR COMPANY
1565 Lathrop Avenue, Harvey, Illinois

SWENSON
Proved Engineering for the Process Industries
SINCE 1889

A Division of WHITING Corporation

Evaporators • Pulp Washers • Filters
Digester Blow Condensers
Turpentine Condensers

Early 18th Century Chinese Snuff Pot or Bottle with Yang-Yin symbol above a boar. From collection of Mrs. H. F. D. Davis.

This symbol (Yang-Yin) represents T'ai-chi, the old Chinese *Ultimate Principle*, and as such, *perfection*. As the Asten-Hill trademark it symbolizes the *best* in paper mill DRYER FELTS.

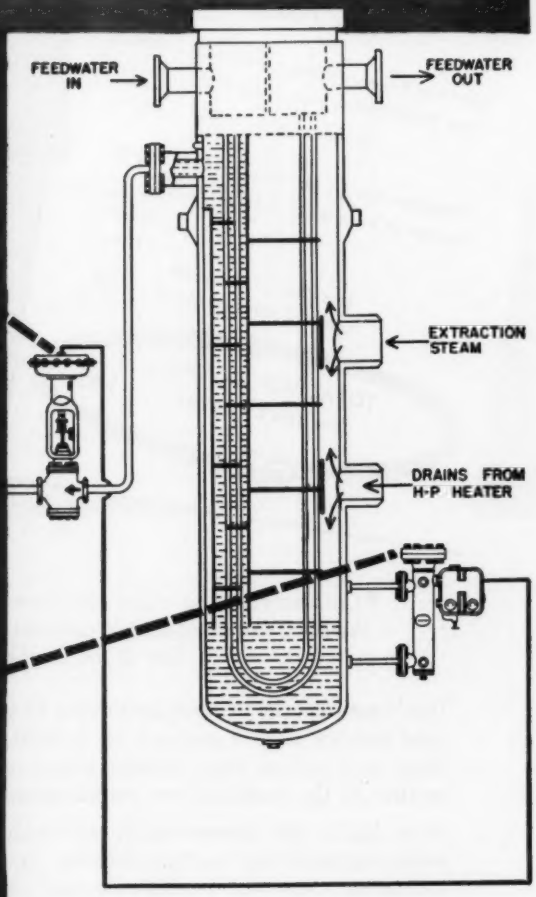
Name and Trademark Registered

ASTEN-HILL MFG. CO.
Philadelphia 29, Pa.
Walterboro, S.C.
Salem, Ore.

ASTEN-HILL LIMITED
Valleyfield, Quebec

FISHER

TAILOR MADE
for Heater
Drain Control



Years of experience in supplying control valves and Level-Trols to steam and power plants has supplied Fisher with the knowledge and ability to build heater drain equipment that will stand up, year in and year out, with a minimum of maintenance.

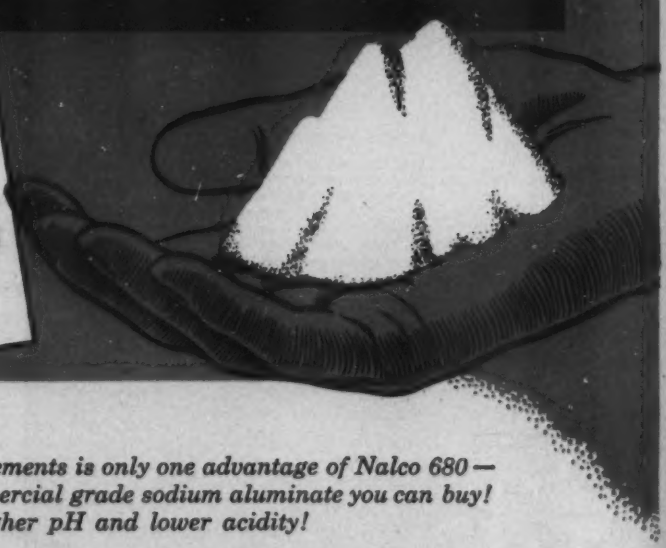
LLTOWN, IOWA
NTARIO
LEVEL CONTROL

FISHER
Since 1880

A $.95 SAVING
PER TON OF PAPER* with

Size Requirements (without Nalco 680) . .	30.25 lb.
Size Requirements (with Nalco 680)	21.60 lb.
Pounds of Size Saved . . .	8.65
Alum Requirements (without Nalco 680) .	40.00 lb.
Alum Requirements (with Nalco 680) . .	30.00 lb.
Pounds of Alum Saved . . .	10.00
Savings on Size (at 15.3 cents per lb.) . .	$1.32
Savings on Alum (at 2.2 cents per lb.) . .	.22
	$1.54
Less Cost of Nalco 680 (at 10.7 cents per lb.) . . .	.59
TOTAL NET SAVING, per ton of paper	$.95

STABILIZED *Sodium Aluminate*



**Cutting size and alum requirements is only one advantage of Nalco 680 — the best, the most stable commercial grade sodium aluminate you can buy! Use it for higher pH and lower acidity!*

Don't confuse the production saving in this case history with a cutback in essentials. This mill makes fine writing paper, and quality is the number one requirement.

How Nalco 680 improved specifications while cutting the cost is obvious in the following: *Size test ratings jumped from a range of 45-50 up to 50-60. Ash content went from 5.6-5.8% to 7-7.1%.*

There are many, many other case histories of Nalco 680 success — power savings, greater alumina retention, cleaner machines, better products.

If you would like results like this in your mill, we suggest you check with your Nalco Representative. He has the facts on Nalco 680 applications and will help you all along the way.

NATIONAL ALUMINATE CORPORATION
6232 West 66th Place • Chicago 38, Illinois
CANADA: Alchem Limited, Burlington, Ontario
NORTHWESTERN UNITED STATES, HAWAII and ALASKA
The Flox Company, Inc., Minneapolis 3, Minnesota
ITALY: Nalco Italiana, S.p.A. SPAIN: Nalco Espanola, S.A.
WEST GERMANY: Deutsche Nalco-Chemie GmbH

THE Nalco SYSTEM...Serving the Paper Industry through Practical Applied Science

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 38 • NUMBER 3 • JUNE 1956

Published monthly by:
FRITZ PUBLICATIONS, INC.
Edward B. Fritz (1869-1939), Founder

Publication Staff:

President and General Manager
A. SCOTT DOWD

Vice President and Treasurer
A. C. L. FRITZ

Secretary
A. C. BRUCE

Editorial Director
A. W. J. DYCK, Ph.D.

News Editor
D. W. ZEIGLER

Sales Manager
R. M. McFARLAND

Production Manager
CHARLES E. DOWD

Circulation Manager
JOHN H. REARDON

Advertising Representatives:

CHICAGO 5: **Jack Henderson,** 431 South Dearborn Street, Wabash 2-3543

CLEVELAND 20: **Wm. W. Andrews,** 3096 Livingston Road, Wyoming 1-7144

EASTERN: **Jack Bain Company,** 545 Fifth Avenue, New York 17, N.Y., Murray Hill 2-3345

WEST COAST: **Murray Bothwell,** 234 East Colorado St., Pasadena, Calif., Ryan 1-9155

THE PAPER INDUSTRY—founded in 1919—known as "The Paper Industry and Paper World" from June, 1939, through December, 1949, assumed its original title with the January, 1950, issue.

Published at 1501 Washington Road, Mendota, Illinois.

Address all correspondence intended for publication to Editorial and Executive Office, 431 South Dearborn Street, Chicago 5, Illinois.

Member: Business Publications Audit of Circulation, Inc.

Accepted as controlled circulation publication at Mendota, Ill.

Subscription rates: United States, U. S. Possessions and Canada, $3.00 for one year. All other countries, $8.00 for one year, $18.00 for three years, payable in advance in U. S. Funds.

Features . . .

Editorial — Executive training 189

Whither? — Output records, newsprint demand, resins, single stage bleach, polyethylene-wax blends, debarking oak, water needs 268

Continuous vs. batch pulping 191

Methods of applying coatings 211

Crossett's five-cylinder machine 214

Xatron drives for the pulp and paper industry 218
by R. T. Willard and M. H. Phelps

Maintenance of recording instruments 220
by Leo Walter

Simple inventory system increases productivity 222
by George J. Bevans

Lockport Felt Co.'s new Mississippi plant 224

Ingenuity reduces shutdown time at Powell River 230

News . . .

News of the Industry 230

Necrology 245

Names in the News 242

Departments . . .

Current Comments 227

New Products 253

Coming Events 241

New Literature 261

Patent Reviews 246

Current Market Quotations 265

Foreign Abstracts 251

Index to Advertisers 267

The PAPER INDUSTRY is indexed regularly in **Engineering Index** and **Industrial Arts Index.** An index to each volume is issued annually by the publisher as a part of the April number.

© 1956 by Fritz Publications, Inc.

Clinton® enzyme conversion starches

Yes, that's the advice we give papermakers who are looking for enzyme conversion starches. We tell them how Clinton starches PM3011 and PM3021 convert uniformly to give that wanted penetration. — How they increase strength and give better printing surface.

From application to drying, we tell them, Clinton PM3011 and PM3021 give more efficient coating because they convert well at high solids levels.

And no one has to tell a papermaker what all that means to *customers!* That's why so many *try* — and *like* — and *stay* with — Clinton enzyme conversion starches. Like we tell them, *you* try Clinton convertible starches PM3011 and PM3021.

. . . and remember: technical service in connection with your specific problems is available without obligation.

Quality products

FROM THE WORLD'S CORN CENTER

CLINTON

CLINTON CORN PROCESSING COMPANY
A Division of Standard Brands Incorporated
CLINTON, IOWA

From our point of view . . .

Executive training

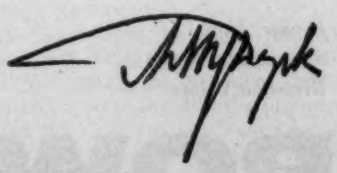
Nothing is more important to the future of a company than the quality and degree of training of its supervisory personnel at all levels of operation and administration. A modern industry's performance must carry the mark of excellence in every respect. This fact and the current industry trend toward expansion and diversification are placing a premium on technical men—especially those who combine a business sense with their technical qualifications. A job simply cannot be done successfully unless the people engaged in it are eminently qualified, and the high degree of scientific and engineering know-how that goes with the operation of a modern plant rather shifts the emphasis on technical training as a basic measure of evaluating the qualifications of the industry's executive talent.

In recognition of this problem, practically every major industrial establishment now conducts some form of executive development program, either within its own organization or by making arrangements to have those showing promise of attaining executive stature attend a special university course at one of the 29 universities offering such courses.

While the executive development programs conducted by many industrial establishments do meet an immediate requirement, they do not eliminate the currently felt problem of shortage of adequately trained scientific and executive manpower. This problem must be solved at the source—namely, the colleges and universities. It is such thorough training alone that provides maximum assurance that the man selected for an executive position will have the broad, basic knowledge and the confidence he needs as he progresses toward leadership and experience in a complicated technological industrial establishment.

What is needed, therefore, is a new attitude toward and a new recognition of our colleges and universities. The current attitude that tends to recognize and reward the nation's best brain power by diverting it away from the teaching profession into industry is both short-sighted and in opposition to the nation's interest.

Conditions must be created to keep the nation's best brain power at the colleges and universities. It is here where it literally "lays the golden egg" by attracting and training better men to qualify as better executives to meet the exacting requirements of a virile and increasingly productive technological industry.



When the pressure is on

As a final step in the manufacture of Powell Valves, every valve is subjected to an *actual line test*—a *positive method* of testing. For special services, valves can be given hydrostatic, air and gas tests so that they will meet various fluid control services.

Thus, when the pressure is on *you*—when you have a production schedule that must be met—that's when you'll be glad you installed Powell Valves.

No matter what your flow control problem may be, Powell has valves designed to solve your problem. And you can *depend* on long, trouble-free service. Through careful quality control, *every* Powell Valve has PERFORMANCE VERIFIED.

Because of Powell's painstaking quality control, plant shutdown through valve failure is greatly reduced. Records from refineries, power and industrial plants the world over prove it.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our *complete quality line* which has *Performance Verified.*

The Wm. Powell Company
Cincinnati 22, Ohio
. . . 110th YEAR

PERFORMANCE
PV
VERIFIED

Bronze, Iron, Steel and Corrosion-Resistant Valves

FIG. 2201—Lubricated Plug Valve. Semi-Steel for 175 Pounds W.O.G.

FIG. 1893—(Sectional) Alloy Cast Iron O.S. & Y. Gate Valve for 200 Pounds W.O.G.

FIG. 2193—Large Size Ni-Resist Gate Valve for 200 Pounds W.O.G.

POWELL VALVES

Continuous vs. batch pulping

— questions and answers*

Answers to questions on continuous vs. batch pulping in this issue are provided by: W. J. Nolan, University of Florida, Gainesville, Fla.; L. E. Eberhardt, Bauer Bros. Co., Springfield, Ohio; Frederick Wierk, Reynolds, Smith & Hills, Jacksonville, Fla.; Jesse Bradbury, Southland Paper Mills Inc., Lufton, Tex.; Peter Borlew, National Container Corp., Jacksonville, Fla.; J. McK. Limerick, Bathurst Power & Paper Co.; and J. M. Loving, West Virginia Pulp & Paper Co., Covington, Va.

Effect of chip moisture

Q. Does kiln drying change the pulping characteristics of wood?

A. (W. J. Nolan) I can't see any appreciable difference in our laboratory cooks. It is our normal procedure to kiln dry the chips so that we can test them over a period of time. We have run several series of experiments to check this usage of kiln dried chips, and compared them to duplicate cooks using green chips. We have noticed no difference in the cooking rates. There may be a slight tendency toward cellulose degradation in the kiln dried chips, as moisture in the chips may cause milder concentration at the reaction surfaces. However, in plotting yield against time you can't distinguish between the curves for green wood and kiln dried wood. The physical strengths are about the same.

Q. Have you tried wetting the oven dried chips before cooking?

A. (Dr. Nolan) No, as a rule, we didn't. We did, on a few occasions, soak the chips to see whether water soaking made any difference, but we couldn't distinguish any difference in the cooking curves. Of course, in our cooks, we make allowance for the lack of moisture by increasing the amount of liquor to the chips. When we are using green chips, we use a little higher concentration than for dry chips so that, when liquor and chip moisture are considered together, the concentration is the same as that used for kiln dried chips.

Q. Have you tried air drying instead of kiln drying?

A. (Dr. Nolan) No, we never air dry the chips. After kiln drying we allow the chips to reach air-dry equilibrium but we never used a slow drying process. In slow drying the chips would mold as we often have quite warm and humid conditions in our laboratory.

Q. Would you expect variatons in moisture due to storage to affect the cooking properties?

A. (Dr. Nolan) I doubt it because we have had wood from various mills and some samples run 45 per cent moisture while others may be as low as 20-22 per cent moisture, and we can't see any difference in cooking rates. When you have rot or mold that's another story.

Q. Do you use the same time to get up to cooking pressure for kiln dry and green wood?

A. (Dr. Nolan) Yes.

A. (L. E. Eberhardt) There is one comment I would like to make. This does not refer to pulp quality, but we have noticed that you can get into considerable difficulty if you try to cook kiln dried chips and green wood as a mixture. Pulping the two as a mixture does not normally work too well. However, there is one thing you can do if you are faced with a problem of utilizing kiln dried wastes together with green wood. You can give the material a light presteaming, resulting in a tendency to equalize chip moisture. I think this might be a way to get around some of the difficulty of cooking a mixture of dry and wet wood.

A. (Dr. Nolan) I agree that pulping green and kiln dry wood in the same digester will give poor results. In effect, the green chips will be cooking at a different concentration than the dry chips, due to differences in moisture content.

Chip shredding

Q. In shredding chips, what percentage of the original chips are rejected by the fine screen and what use can be made of them?

A. (Dr. Nolan) There will be anywhere from 3 to 5 per cent rejects, that is below 10 mesh in cross section. You can burn them but I don't see much sense in screening out the fines. If you have only 3-5 per cent rejects that material, being finer, will of course cook to a lower yield. But it seems to me that a pound of pulp is better than no pulp. So you might just as well put the fines in the digester along with the accepted material and cook them. The fraction that is there is not sufficient to affect your physicals so I can't see any reason for removing the fines and burning them.

A. (Frederick Wierk) I think the answer to that question lies in the adequacy of your recovery boilers as against your bark burning boilers. You can get the calorific value out of the fine stuff in two ways: you can either cook it down in the digester and get it out of your recovery furnace, or you can blow it into your bark burners and get it out there. If the mill is drastically short on bark burning, they might as well cook it. If they're short on recovery capacity they may as well burn it in the bark boilers.

A. (Dr. Nolan) I don't know about that. I would be inclined to say that, even though you do degrade the pulp from the fines, that pulp is worth a lot more than the calorific value of the fines compared to oil.

Q. When you talk of preshredded chips, are you talking only of chips shredded from the green wood or are you referring to chips shredded after carbonate presteaming as you described in earlier publications?

A. (Dr. Nolan) Everything we are talking about here refers to the shredding of green chips with no pretreatment.

Q. The 3-5 per cent rejects you are talking about refers to the shredding operation?

A. (Dr. Nolan) That's right, although you have to qualify that 3-5 per cent. That figure is given with the understanding that you accept the 20-25 per cent oversize which goes back to your shredding equipment. If you plan on cooking the total product from your shredder, keeping oversize at a minimum, the fines may go up to 10-12 per cent of the total.

*Based on papers presented at the Fourth Annual Paper Conference, University of Florida (See THE PAPER INDUSTRY, January, 1956).

Q. What are the effects of chip packing when using shredded wood?

A. (Dr. Nolan) I don't know because we haven't done any large digester operations. However, the very fact that you get 10 per cent less wood into the digester with shredded wood than you do with full size chips would indicate that you shouldn't have any trouble with packing. I infer from the question that you mean by chip packing a drop in percolation rate due to packing of the chips during the cook. I wouldn't expect to have the trouble because we have 10 per cent less wood in the digester when it is full than with full size chips. However, as I said, we have had no actual experience in large scale cooking. If you mean by chip packing the amount of wood that can be initially charged into the digester, only about 90 per cent as much shredded wood can be charged to the digester as compared to full size chips. However, this reduction in charge is more than compensated for by decreased cooking time.

Effect of liquor volume

Q. How does extra liquor affect the pulp quality when running a little over on two-hour cooking? Did it reduce the trouble with hangups and could you see an improvement in quality?

A. (Jesse Bradbury) As we went to higher total volumes of liquor we had much less trouble with hangup in blowing and, perhaps, more uniform quality of pulp.

Q. Wasn't there a top limit to the total volume? By that I mean, did you ever get to the point where you actually got your digester liquor-bound?

A. (Mr. Bradbury) We have used as much as 1100 cu. ft. total volume and at that volume digesters were not liquor-bound. Right now we are adjusting our total volume in relation to the amount of chips that we can get into the digester. When we fill the digesters, if the chip weight comes out 62,000 lb. rather than 64 or 65,000 we feel we are getting dried chips. Therefore we add more black liquor to bring up our total volume.

Fouling of evaporators

Q. At Covington, what has been done to try and correct fouling in evaporators due to semichemical liquor? Have any analyses been made of the scale?

A. (Mr. Loving) There have been no analyses made of the scale because most of the material you get out of the tubes doesn't look like scale, but is organic in nature. We anticipated, of course, when we installed the pulp mill that we were going to have difficulty, and we installed a Waco filter. We thought that was going to be the panacea which would take care of the problem, but since we have increased our semichemical production the fines have been fouling the evaporator. We think that there may be some times, although it may seem a little far fetched, when some of the chemical lines are down for some reason, that we may be setting up a proportion of liquors whereby we are actually precipitating lignin. Although this may not be actually happening in the pulp mill, it may happen in the storage tanks at the evaporator. We are working on this problem now and we don't know the answers, but we hope to have them soon. In fact, we have got to have them soon because it is cutting back on our production. It's a bottle neck in our mill.

Permanganate numbers and lignin contents

Q. What were the permanganate numbers of the fast cooked pulps?

A. (Dr. Nolan) We didn't determine them. We were primarily interested in viscosity of the unbleached pulps rather than bleachability. Therefore we did not evaluate permanganate numbers. However, we did determine lignin content of the pulps, which should give a pretty good idea of permanganate numbers. In the 190 lb. cook, in cooking to maximum screened yield, the lignin content was 6.8. In the 150 lb. cook, the lignin content was 7.2, while at 115 lb. it was 8.8 per cent. You see, there are only three sets of curves shown for 190, 150 and 115 lbs. In general, as the maximum screened yield goes up, the lignin content goes up with it.

A. (Mr. Borlew) For the last one (8.8 per cent lignin) the chlorine number would be about 11, which is beyond the safe range for permanganate numbers. The 7.2 per cent lignin would be equivalent to a chlorine number of about 9 and the 6.4 per cent lignin pulp would have a chlorine number of about 8.5. A chlorine number of 9 would mean a hard cook, I would say, with, perhaps, a permanganate number of 32.

A. (Dr. Nolan) There is one point there. If you cook to the maximum screened yield in continuous operation, a hard pulp will result because it will be high in lignin. If you want to cook for bleachable grades with a fast cook, you are going to have to cook beyond the maximum screened yield and come down a little on screened yield in order to bring the lignin content down.

High-yield batch pulping at Bathurst

Q. How large a variation in percentage rejects do you find in the blow tank?

A. (J. McK. Limerick) I don't have any figures on the screenings from the blow tank. I would not like to even guess as I don't want to give you something that isn't right. We make periodic checks on our refined pulp, screening on a 7 cut laboratory flat screen. We obtain 2.5-3 per cent rejects from this test.

A. (Mr. Simmons) Screenings at the blow tank will run 20 to 30 per cent.

Q. Do you uncap your digesters to run liquor in after you have relieved the initial 5 lb. pressure or do you have a liquor line welded in the digester?

A. (Mr. Limerick) You would defeat your whole purpose if you take the cover off. Once you have relieved to the atmosphere, the cover is on and stays on. You close your relief, pump the liquor in, with the absence of air. That is the purpose of the whole procedure. It is, in fact, very important not to remove the cover.

Q. Do the insurance people require any type of safety disconnect on that liquor line into the digester?

A. (Mr. Limerick) Apparently not.

Q. I was wondering what type of liquor pump is used. Is it a centrifugal?

A. (Mr. Limerick) Yes.

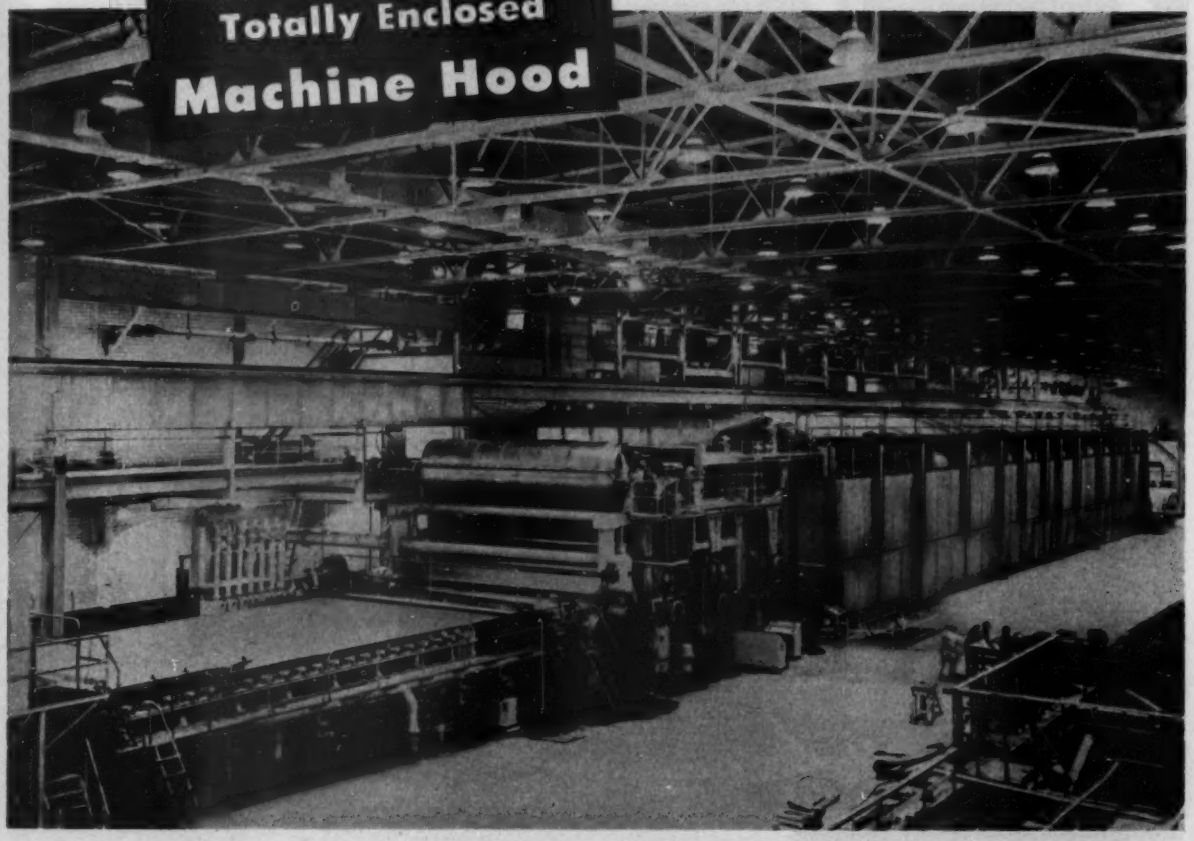
Q. In high yield pulping of soft woods, at what lignin content does pulp have optimum strength or, as lignin is increased, at what point does strength begin to decrease?

A. (Mr. Limerick) That is a fundamental proposition. At blown strength, that is, the unbeaten strength, as your lignin goes up your strength, naturally, comes down. I am thinking now of mullen strength, perhaps not so much in tear. Under the conditions of high yield

(Continued on page 244)

Pat. Pending

ROSS-HOOPER Totally Enclosed Machine Hood

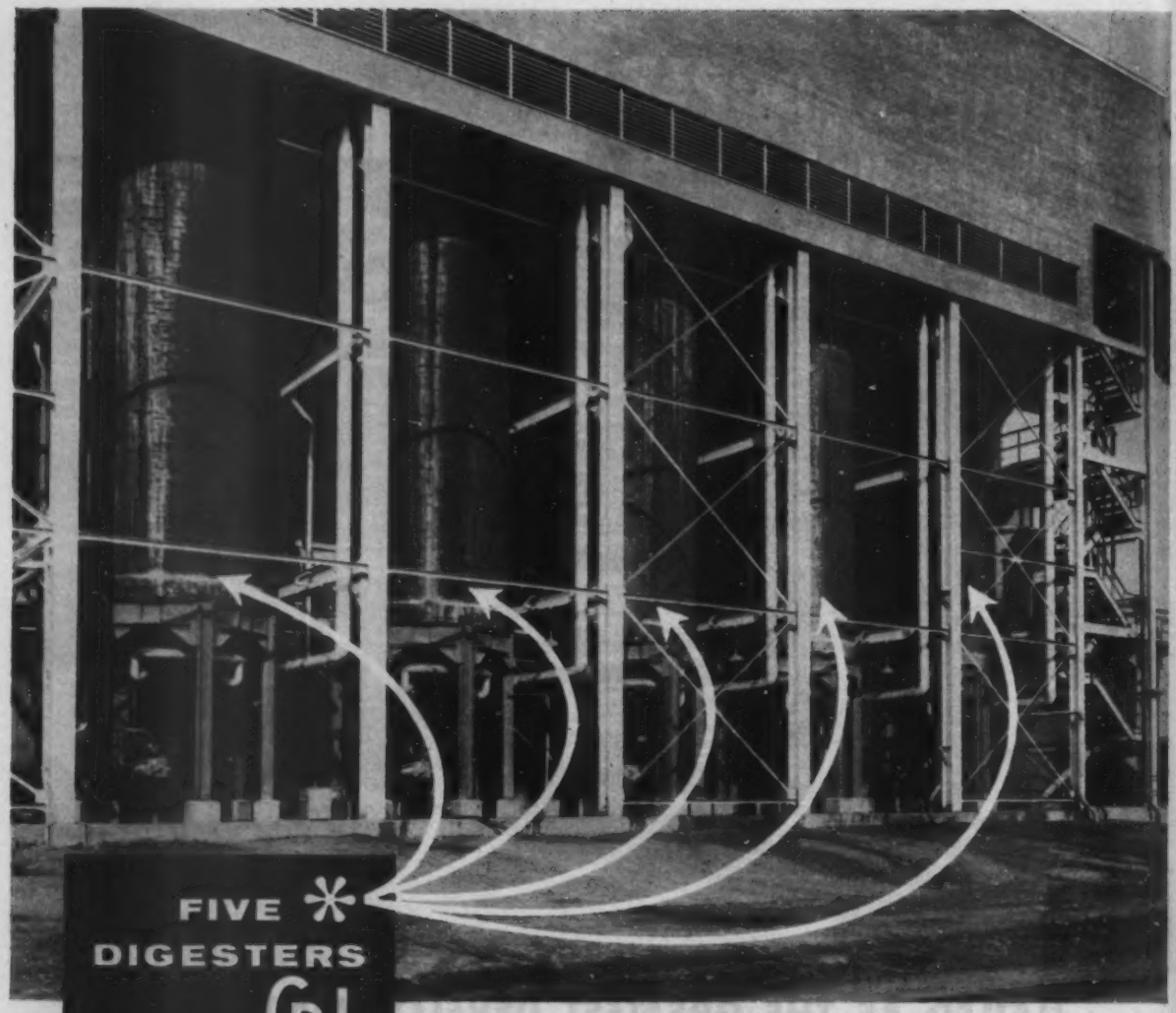


HAILED AS THE GREATEST DEVELOPMENT IN 20 YEARS OF PAPER MAKING

In a little more than two years time, the ROSS-HOOPER Totally Enclosed Hood has practically revolutionized older methods for the production of paper. By completely enclosing the machine while maintaining easy access to it, the design and construction of this new hood has definitely achieved entirely new standards of machine operating speed and economy. In such important factors as drying uniformity, fresh air volume, amount of heat recovery, improved back pressure, moisture content, breaks and working conditions, new figures are replacing the old to reflect greatly increased efficiency. Our new Bulletin No. 26 gives full particulars. Write for a copy now.

ROSS Air Systems Engineering

J. O. ROSS ENGINEERING CORPORATION 444 Madison Avenue, New York 22, N. Y.
Offices • Atlanta • Boston • Chicago • Detroit • Los Angeles • Seattle • Montreal • Toronto • Port Arthur • Vancouver



. . . help handle over 400 tons of unbleached sulphate daily for southern mill

Six digesters, five of which were built by CB&I of A-285 Grade "B" fire box steel, handle over 400 tons of unbleached sulphate daily at the Bowaters Southern Paper Corporation's $60 million newsprint and sulphate mills at Calhoun, Tenn. Each digester has a shell thickness of two inches and weighs approximately sixty-two tons.

CB&I's facilities for designing, fabricating and erecting steel plate structures are complete . . . including equipment at all four plants for stress relieving, X-raying and pickling and painting. When you plan steel plate structures, write your nearest CB&I office for information, estimates or quotations.

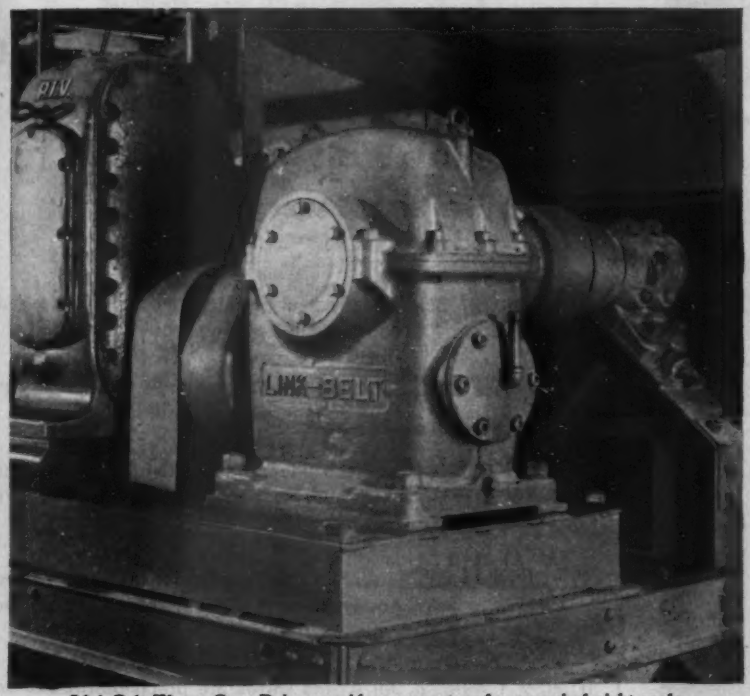
CB&I

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

Here's real versatility! LINK-BELT offers you

19 VARIATIONS in WORM GEAR DRIVES



Link-Belt Worm Gear Drive provides compact and economical right-angle power transmission to apron conveyor. Conveyor speed is readily changed by P.I.V. Variable Speed Drive to suit operating conditions.

Meet specific needs from industry's most comprehensive line

WHATEVER the need . . . whatever the speed — Link-Belt Worm Gear Drives can meet your requirements for simple, compact, fixed-ratio speed reduction. With them, you can change the direction and velocity of power . . . match high motor speeds to modern production needs with the least power loss, best possible balance of torque and horsepower ratings.

Choose from a wide selection for fractional or large horsepower requirements. Available with horizontal and vertical housings to permit convenient connections to prime movers and driven machinery.

Single-Worm Gear Drives in ratios from 3.1:1 to 100:1 with output capacities to 97.9 hp.

Helical-Worm Gear Drives in ratios from 26:1 to 540:1 — output capacities to 56.7 hp.

Double-Worm Gear Drives in ratios from 26:1 to 8000:1 — output capacities up to 26 hp and 124,000 inch-pounds torque.

8 of 19 types in the broad Link-Belt line

Type WB—Single reduction, worm below gear, horizontal output shaft.

Type WVS—Single reduction, worm on top of gear, horizontal shaft with screw conveyor flange.

Type HWV—Helical gear first reduction, worm gear final reduction. Vertical output shaft (up or down).

Type HWB—Helical gear first reduction, worm gear final reduction. Worm below gear, horizontal output shaft.

Type WV—Single reduction, vertical output shaft (up or down).

Type DWV—Double worm reduction gear, vertical output shaft (up or down).

Type DWB—Double worm reduction gear, horizontal output shaft.

Type WVT—Single or double reduction overhead conveyor drive.

For full information, consult your local Link-Belt office or authorized stock-carrying distributor. Or write today for Book 2324-A.

LINK-BELT

ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.945

ATKINS
Silver Steel®
MACHINE KNIVES

Built-in endurance for your job!
Atkins offers a complete line of machine knives...
...a knife for every job.

Silver Steel Scientifically analyzed and specially processed for each particular cutting requirement.

Expertly Hardened Electric furnace-hardened under rigid control conditions insures rugged, long-life duty.

Specially Tempered Electronic controls regulate tempering to exact specifications for each knife . . . for each type of cutting.

Skillfully Welded Welding techniques for laid type knives are governed by the skill of years of experience in knife manufacturing.

Precision Ground All Atkins knives are precision ground on the most modern machines available. Accuracy in beveling and keen cutting edges are always assured.

Protection Packaged Atkins knives are carefully packaged to insure complete protection in handling. The edges ride clear . . . never contact the packing case.

ATKINS Silver Steel SAWS BW

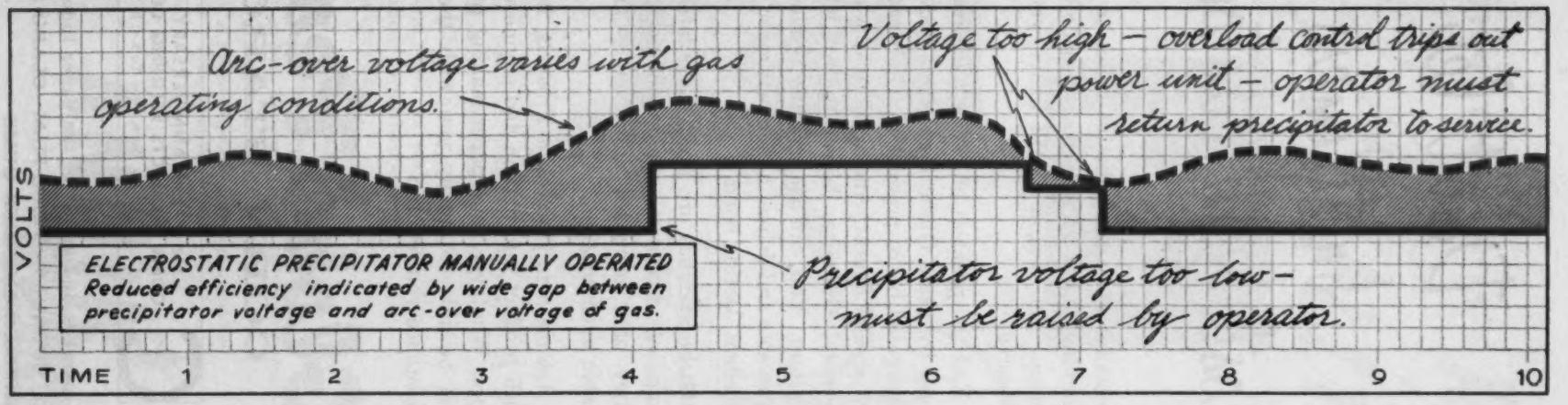
You can't buy experience, but you can buy the result . . . Buy Atkins!

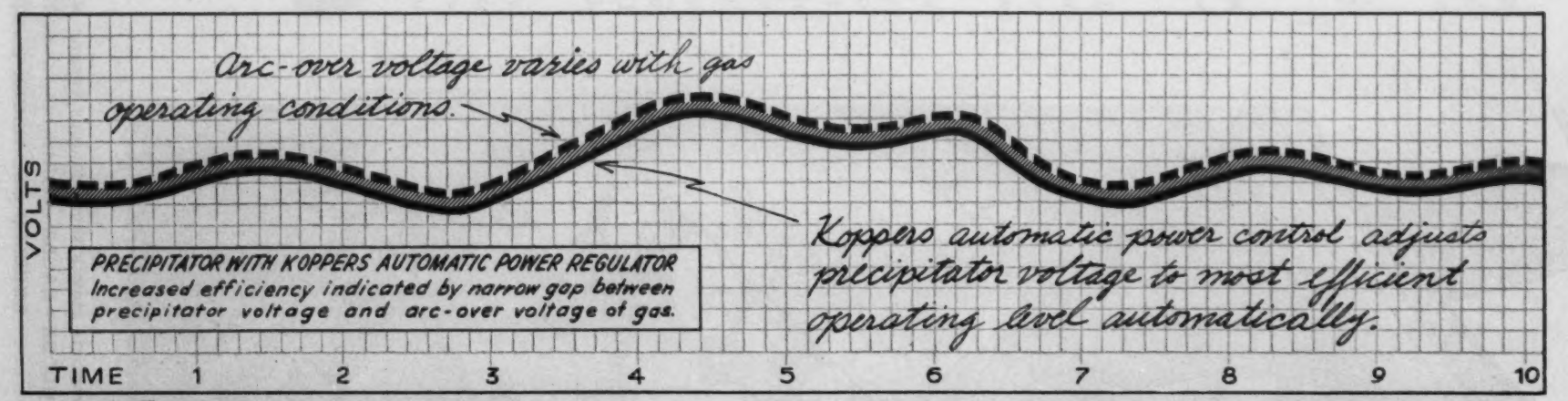
ATKINS SAW DIVISION
BORG-WARNER CORPORATION
INDIANAPOLIS 9, INDIANA

BRANCHES: Chattanooga • Chicago • Los Angeles • Philadelphia • Portland, Oregon
EXPORT SALES: Borg-Warner International, 36 S. Wabash Ave., Chicago 3, Illinois

1856 • ONE HUNDRED YEARS OF QUALITY SAW MANUFACTURING • 1956

EFFICIENCY GRAPHS: Comparative graphs show the relative difference between MANUAL and AUTOMATIC power operation for electrostatic precipitators


Arc-over voltage varies with gas operating conditions.
Voltage too high – overload control trips out power unit – operator must return precipitator to service.
VOLTS
ELECTROSTATIC PRECIPITATOR MANUALLY OPERATED
Reduced efficiency indicated by wide gap between precipitator voltage and arc-over voltage of gas.
Precipitator voltage too low – must be raised by operator.
TIME 1 2 3 4 5 6 7 8 9 10


Arc-over voltage varies with gas operating conditions.
VOLTS
PRECIPITATOR WITH KOPPERS AUTOMATIC POWER REGULATOR
Increased efficiency indicated by narrow gap between precipitator voltage and arc-over voltage of gas.
Koppers automatic power control adjusts precipitator voltage to most efficient operating level automatically.
TIME 1 2 3 4 5 6 7 8 9 10

SEND FOR FREE BULLETIN

Free bulletin shows in detail how this compact cabinet unit reduces wasteful "sparkover" and enables Koppers Precipitators to operate continually at peak efficiency voltage without frequent "trip-outs." See how this new Koppers Automatic Power Regulator eliminates need for constant personal attention. For bulletin M40 . . . or if you desire an analysis, or recommendation for your operation . . . write to Koppers Company, Inc., *Industrial Gas Cleaning Dept.*, 4606 Scott St., Baltimore 3, Md.

KOPPERS®

ELECTROSTATIC PRECIPITATORS

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE 3, MD. This Koppers Division also supplies industry with Fast's Couplings, American Hammered Industrial Piston and Sealing Rings, Aeromaster Fans, Gas Apparatus. Engineered Products Sold with Service.

Don't let brittleness cost you customers

Breakage of brittle adhesive bonds in scoring or handling shows up as a poorly made corrugated carton. The customer will blame you, not the adhesive.

End the problem of brittle adhesive and poor bond by using Globe Pearl corn starch in your corrugated board production. Globe starch yields low spread figures. And because it will not stick to metal, Globe can be run the full width of the medium. You can get greater production with less waste and deliver a much stronger board with excellent, lasting bond.

Globe starches are always available in a full range of viscosities—even high viscosity types. They offer increased adhesiveness and remain stable in circulation.

Ask the man from Corn Products, he can help with product information and engineering assistance. Whatever your paper-making problem, he will be able to supply you with the technical assistance you require.

Globe® Pearl
CORN STARCH

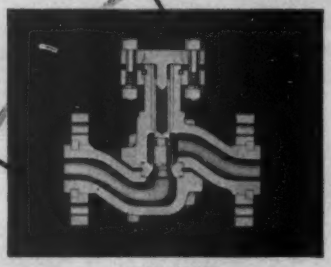
1906 • 50th ANNIVERSARY • 1956
CORN PRODUCTS REFINING COMPANY
17 Battery Place, New York 4, N. Y.

Corn Products makes these famous brands of starches and gums for the paper industry:
HERCULES · GLOBE · EAGLE · FOXHEAD · AMIJEL · CORAGUM · TEN-O-FILM · CLARO STARCHES EXCELLO AND GLOBE DEXTRINES · LAM-O-DEX GUMS

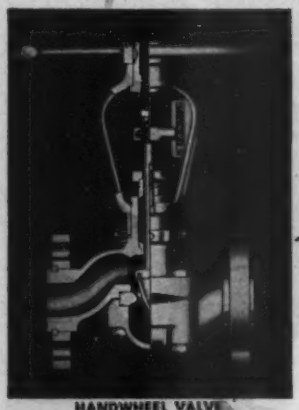
AROUND-THE-CLOCK RELIABILITY

with Annin

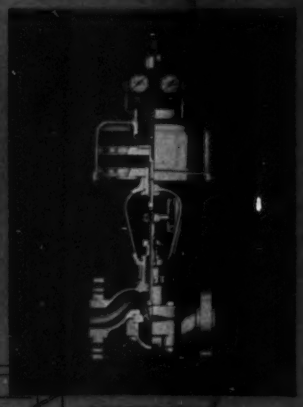
The complete line of Fluid Control Valves to meet every installation requirement



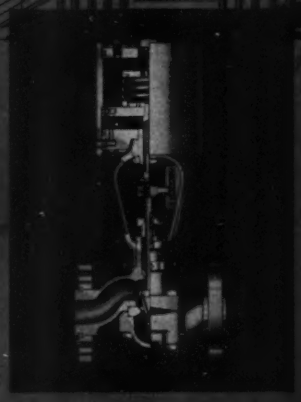
CHECK VALVE



HANDWHEEL VALVE



DOMOTOR VALVE

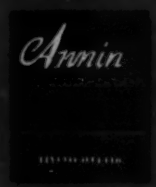


CYLINDER VALVE

Yes, *Annin* offers design and control engineers a complete line of valves for rugged and reliable performance "around-the-clock." Name the installation—rocket stand, aircraft component test facility, chemical plant, refinery, paper mill or power plant—and *Annin* valves will exceed the most critical performance needs, with features like:

- **Piping flexibility**
- **Pressure ratings to 10,000 PSI**
- **Body designs for gases to molten metals**
- **Temperatures from −400°F to +1600°F**
- **Interchangeable operators—Domotor, Cylinder or Handwheel**

ANNIN'S new and comprehensive valve catalog 1500-C is now ready for distribution. Send for your copy today.



ANNIN Control VALVES

THE ANNIN COMPANY

5470 EAST TELEGRAPH ROAD, LOS ANGELES 22, CALIFORNIA

does STAINLESS STEEL TUBING really cost more?

Stainless steel tubing may appear expensive when you consider only its initial cost. But in evaluating your choice of tube materials you should bear in mind (1) the difference between initial cost and installed cost (2) the cost/life ratio of the materials you select (3) the degree of corrosion and oxidation protection afforded and (4) adherence to the pressure and temperature requirements of your operation. Downtime and the labor cost of replacing worn-out tubing made of common materials can be a great deal more expensive than the extra first cost of long-lasting stainless.

Stainless steel tubing may well cost you less, as you will find when you sit down with Mr. Tubes, your link to B&W. He can help you get more for your money with stainless. *Or write for Bulletin TB 365.* The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

B&W
TUBULAR PRODUCTS DIVISION

TA-6063P

Seamless and welded tubular products, seamless welding fittings and flanges—in carbon, alloy and stainless steels

CHAIN BELT answers your wood handling problems . . .

NEW REX® DUROBAR WS* CONVEYOR CHAINS GIVE LONGER SERVICE, BETTER OPERATION

Right where the most sliding wear takes place, these new Rex Durobar Conveyor Chains have an extra heavy shoe on the block link. On woodyard conveyor service, or for any conveyor application where wear due to sliding is a problem, these chains are the economical answer.

This special wearing shoe not only adds extra life to the chain, but also improves its operation in the trough. There is less side play and wear to chain sides — a feature that boosts performance and cuts down repair and maintenance costs. Look over the features of this chain and you will see why lumber, chemical, pulp and paper mill companies prefer Rex Durobar WS Chains over all others for conveyor service.

- Extra heavy wearing shoes with reinforced rib materially lengthen chain life, improve performance and reduce costs.
- 3-diameter pin. A famous Rex feature that makes assembly and disassembly easy and quick.
- Close tolerances and quality construction. Close-fitting pins and links insure longest service. Heavy-duty, rugged construction — eccentric barrel puts more metal in contact with sprocket to lengthen service life of both chain and sprocket.
- Available in tough Rex Malleable Iron or wear-defying Rex Z-Metal. In Z-Metal, this chain has additional strength plus corrosion and abrasion resistance qualities.

Rex A-132-WS Durobar Conveyor Chain—Average Ultimate Strength—Malleable Iron—50,000 Lb. Width, Inches — 6-11/16.

*Special Wearing Shoes

and for your other chain or conveying needs —

CHAIN BELT COMPANY

LEADERSHIP . . . through creative engineering

CHAIN BELT has the answer to lower costs for every WOOD HANDLING job!

• Here, from the *complete* line of CHAIN Belt products you will find the answer to your power transmission, conveying or elevating problems. Not only will you find the exact chain, idler or bearing to fit your work — you will find the highest quality and dependability . . . quality built on over half a century's experience supplying the forest products industry.

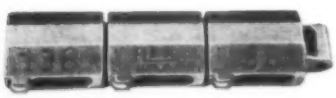
Carefully selected metals . . . skillful hardening or heat-treatment . . . experienced workmanship and design . . . combine to produce the finest products — products that give you longer service, reduce down-time and cut maintenance costs. Whatever your wood handling problem, CHAIN Belt will give you the cost-cutting answers.

Rex H-Type Mill Chain — Most popular of all sawmill size chains for conveyor use. A tough, versatile chain with special wearing shoes for sliding.

Rex H-Type Mill Conveyor Chains—Used for conveying slabs, chips, sawdust and refuse. Heavy, one-piece links with thick barrel provide long wear and good scraping action.

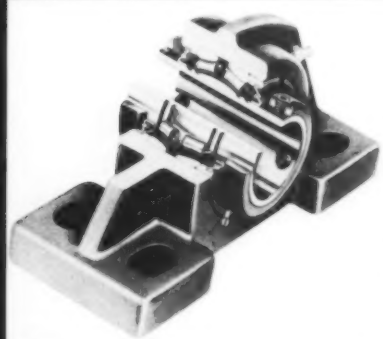
Rex Durobar and Combination Chains — A proven standard for wood handling service. Eccentric barrel of Durobar chain reduces wear on both chain and sprockets.

Rex Roller Drive Chain—The ultimate in high-speed drive chain. Highly flexible to withstand heavy shock loads. Precision-made for longest life. Available in single or multiple strands for a variety of drive uses.

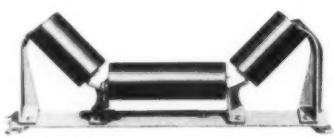


Rex Roof-Top Transfer Chains — Primarily a green chain, but frequently found in sawmill transfer service. Choice of peaked or flat roof-top design. Flat roof generally used for handling finished lumber as it will not score.

Rex Chabelco Chains — For severe conveyor service, Rex Chabelco Chains are first choice. Available in both straight and offset side bar construction. Also special Chabelco Chains designed for log deck, log haul-up, trimmer, etc. service.



Shafer Self-Aligning Roller Bearings — These bearings combine the best advantages of the roller and the ball by using concave rollers operating between convex races. Their stamina and dependability have been proved under extreme load conditions found in the lumber and pulp industries. Their reserve capacity is your assurance of longest life and continuous peak performance.



Rex Style No. 46 Troughing Idler — Specially designed for handling wood chips. Concentrating rolls of the idler are sloped at 45° to provide exceptional carrying capacity. This feature permits loading of chips close to the belt edge without spillage and gives the belt additional carrying capacity when compared to the conventional 20° sloped idlers.

CHAIN Belt Company
Dept. FP-3
Milwaukee 1, Wisconsin

☐ Please send catalog on Rex products for the Forest Products Industry.

☐ I would like to discuss my wood handling problems with a CHAIN Belt District Sales Engineer.

Name.....

Company.....

Address.....

City..... State.....

CHAIN BELT COMPANY

MILWAUKEE 1, WISCONSIN

he's HUYCKing your way...

The object of the periodic visits of *your* Huyck Field Service Engineer is, of course, a friendly one: he wants to help you lower felt costs and keep them low.

Technically trained in both felt and paper making, he will not only work with you in correcting operational difficulties, but offer you the benefit of his know-how in analyzing your specific machine clothing requirements as well.

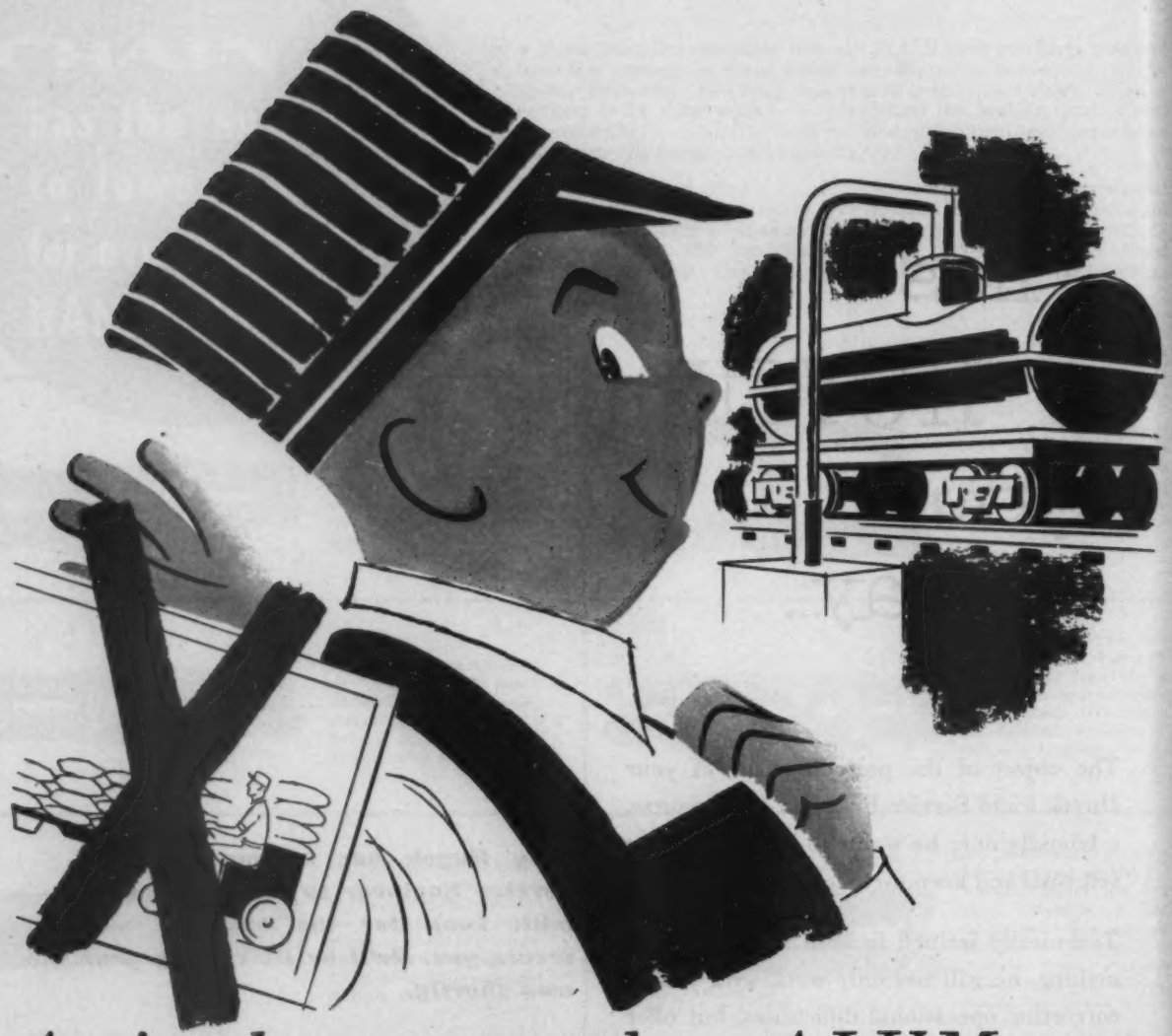
Huyck is able to make *new* improved quality felts for you—an important factor in reducing your costs—by coordinating the efforts of the largest field service, design and development staffs in the felt industry.

Only Huyck has assigned a Field Service Engineer to each and every mill. Look for the engineer who serves you. He'll be HUYCKing your way shortly.

NEW!
HUYCK FELTS
FIRST IN QUALITY FIRST IN SERVICE

F. C. HUYCK & SONS • Rensselaer, New York
Established 1870

IN CANADA: KENWOOD MILLS LTD.
Arnprior, Ontario • Established 1918



A simple way to reduce ALUM costs

Use Cyanamid's liquid alum

On a solids content basis, delivered cost of liquid alum is usually less than cost of dry alum.

Handling costs less, too. The time-consuming operation of unloading, storing and conveying bags of dry alum is eliminated. Liquid alum is discharged from tank cars or trucks directly into a storage tank. Your pumps and pipes do all the rest.

Depending on the quantity you use, these savings may enable you to write off the investment in liquid handling facilities in a very short time. From then on, you cash in on direct savings, *and* the greater efficiency and accuracy of metering Cyanamid's liquid alum directly into your papermaking or water-treating equipment.

Your Cyanamid representative will be glad to help you determine how much you can save in your location, and assist you with the design of a suitable handling system.

THE LARGEST VARIETY OF PAPER CHEMICALS to serve every industry need is offered by Cyanamid and is backed by the services of technical experts with years of practical mill experience.

CYANAMID

AMERICAN CYANAMID COMPANY
PAPER CHEMICALS DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Sales Offices: Boston • Charlotte • Chicago • Cleveland
Kalamazoo • Los Angeles • Mobile • New York • Philadelphia
Portland, Ore. • Seattle

In Canada: North American Cyanamid Limited, Toronto and Montreal

In paper machinery, too . . .

ACIPCO

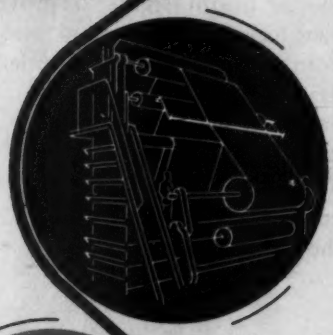
Centrifugally Spun STEEL TUBES

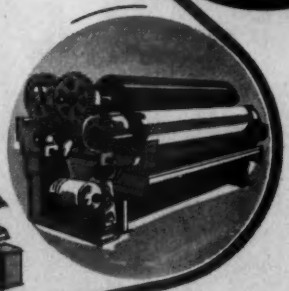
Keep Production Rolling

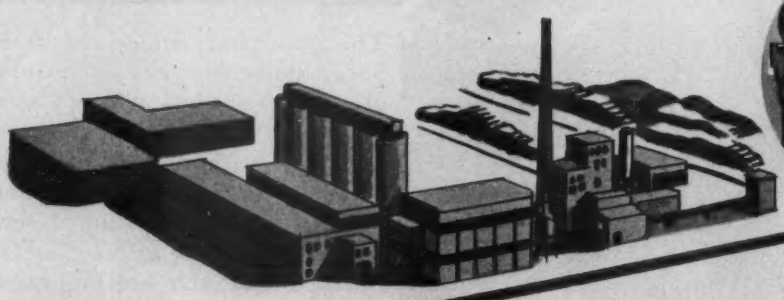
Today's paper machinery is high speed, high production equipment. Acipco steel tubes are top quality tubes for paper machinery components . . . physically and metallurgically capable of withstanding the stresses of modern paper mill operation.

Because they are centrifugally spun, Acipco steel tubes possess inherent qualities of dynamic balance, dimensional stability, and improved machinability. These qualities add up to important savings for the equipment manufacturer and the paper producer alike.

Investigate Acipco centrifugally spun steel tubes for your application. You will probably find extra quality at extra savings.







ACIPCO centrifugally spun steel tubes are used in the manufacture of calender, engraving, press, slitter, rewinder, plate cylinder, squeeze and starch bath rolls, as well as in hundreds of other industrial applications.

SIZE RANGE: Lengths up to 16′ — longer lengths by welding tubes together. OD's from 2.25″ to 50″; wall thickness from .25″ to 4″

ANALYSES: All alloy grades in steel and cast iron, including heat and corrosion resistant stainless steels; plain carbon grades and special non-standard analyses.

FURNISHED: As cast, rough machined, or finish machined, including honing.

DISTRIBUTORS:

Austin-Hastings Co., Inc.
226 Binney St.
Cambridge 42, Mass.

J.M. Tull Metal & Supply Co.
285 Marietta St., N. W.
Atlanta, Ga.

Peter A. Frasse and Co., Inc.
17 Grand St.
New York 13, N. Y.

C. A. Roberts Co.
2401 Twenty-fifth Avenue
Franklin Park, Ill.

Lyman Tube & Bearings, Ltd.
920 Ste. Sophie Lane
Montreal 3, Canada

Strong, Carlisle & Hammond Co.
1392 W. Third St.
Cleveland 13, Ohio

Ducommun Metals & Supply Co.
4890 So. Alameda St.
Los Angeles 54, Calif.

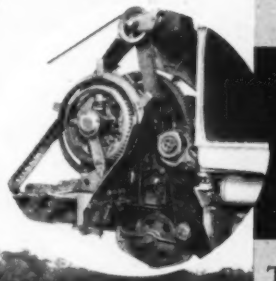
AMERICAN CAST IRON PIPE CO.
Special Products Division
BIRMINGHAM 2, ALABAMA

What is the Crane Combination *YOU* need?

NORTHWEST Crane Equipment is so designed as to meet any crane problem you may have. There is a wide range of boom hoist equipment. Mast-type gantry with the sectional boom hoist rigging and pendent lines make possible ease of adjustment to boom length changes. You have a choice of two or three sheaves at the boom point. Adjustable jib, telescopic boom struts, removable counterweight, extended boom point sheave shaft for pile-driver leads—all can be had to meet your requirements. And, if you need long crawlers and wide treads, they're available.

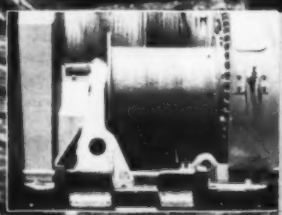
STANDARD BOOM HOIST

The Northwest Standard Boom Hoist is a self-locking worm gear boom hoist running in an oil bath and it operates under power both up and down. It is safe, smooth, positive!



INDEPENDENT HIGH-SPEED BOOM HOIST

The Northwest Independent High-Speed Boom Hoist is independent of all other operations and permits booming with power controlled lowering without sacrificing either of the main drums. It is a rugged, heavy-duty unit capable of hour in and hour out operation. There is no finer, more reliable hoisting assembly.



THIRD DRUM

The Northwest 3rd Drum operates independently of the main drums and is fitted with its own clutch and brake. It makes possible 3 load lines with a standard worm boom hoist; and 3 load lines with the independent high-speed boom hoist.

NORTHWEST ENGINEERING COMPANY

1510-2 Field Building

NORTHWEST

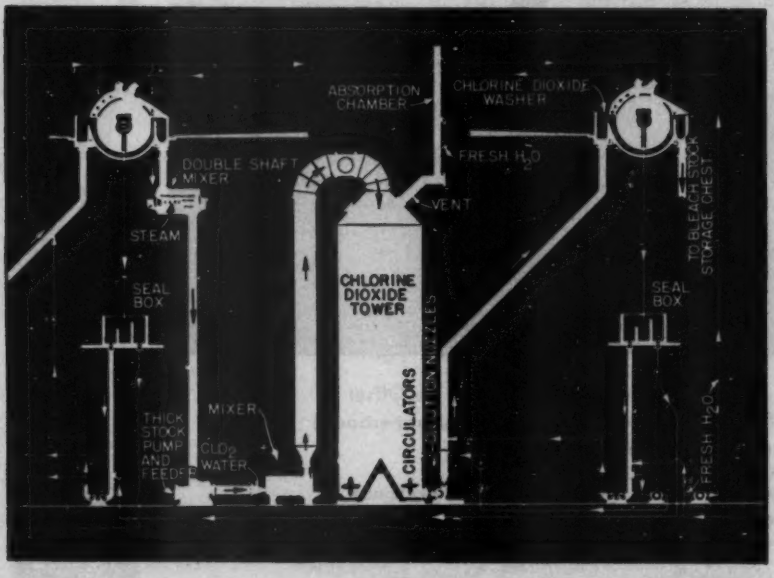
The Crane That Goes Anywhere

10 to 50 TONS

C80-2-LG

90 G.E. BRIGHTNESS

with IMPCO CHLORINE DIOXIDE BLEACHING SYSTEM



PLUS

- Highest Brightness
- Excellent Pulp Quality
- No Strength Loss
- Low Chemical Costs
- Reduced Pulp Shrinkage
- Lower Solids to Sewer
- Fits Any Existing System

With the advent of chlorine dioxide bleaching in the United States, IMPCO studied the problem carefully and tailored the first working high density system. This pioneering unit was installed in a prominent mid-southern kraft mill with outstanding results. Since that time IMPCO systems have gone into operation on soda, sulphite and semi-chemical pulp. This continuous high density process has produced successful results from the very beginning and today 22 IMPCO systems are bleaching over 6000 daily tons of high brightness quality pulps. We welcome the opportunity to work with you.

IMPCO

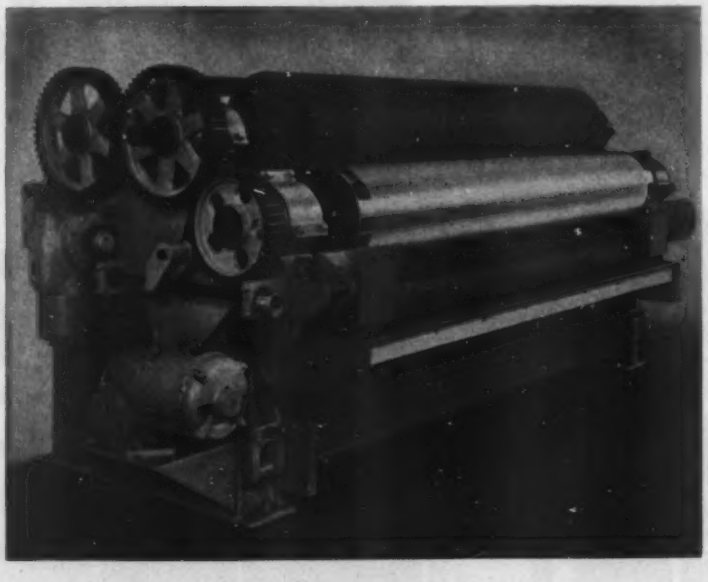
IMPROVED MACHINERY INC.

NASHUA, NEW HAMPSHIRE

Sherbrooke Machineries Limited manufacture similar equipment in Canada

Egan

OFFSET GRAVURE PRINT COATER



Designed for use in paper machine groups, the Offset Gravure Print Coater, clay-coats paper and paperboard at full paper machine speeds.

The end product is used in quality printed magazines and printed paperboard containers.

Send for pamphlets on coating, treating and laminating

FRANK W. EGAN & COMPANY
Somerville, New Jersey

Designers and Builders of Machinery for the Paper Converting and Plastics Industries
Cable Address: "EGANCO"—Somerville (NJER)
Representatives: MEXICO, D.F.—M. H. Gottfried, Avenida 16 De Septiembre, No. 10.

Licensees: GREAT BRITAIN—Bone Bros. Ltd., Wembley, Middlesex, FRANCE—Achard-Picard, Remy & Cie, 36 Rue d'Engheim Xe, Paris. ITALY—Emanuel & Ing. Leo Campagnano, Via Borromei 1 B/7, Milano. GERMANY—ER-WE-PA, Erkrath, bei Dusseldorf.

1856 ★★★★★

ESTABLISHED 1856

Draper Brothers Company

CANTON · MASSACHUSETTS

To: Our Customers

This year marks the 100th Anniversary of the founding of our Company here in Canton. It is time to pause and do honor to the past – a time to plan for the future.

One hundred years spans many hours of trouble, worry and despair, with other hours of fun and friendship and the joy of doing worthwhile things. To the generations of people who have worked here through these years to bring us to this happy birthday, we are deeply grateful.

And, yet, it is to folks like you to whom we owe the most. Without your faith in us and our products, without your sympathetic understanding of our strengths and our weaknesses, without your trust in our ability to serve, there could have been no anniversary to celebrate.

And, so with a confidence grown strong through your support, we look forward eagerly to our second century. Surrounded by research and engineering institutions and with a source of materials and equipment close at hand, we stand ready to serve you in the years ahead.

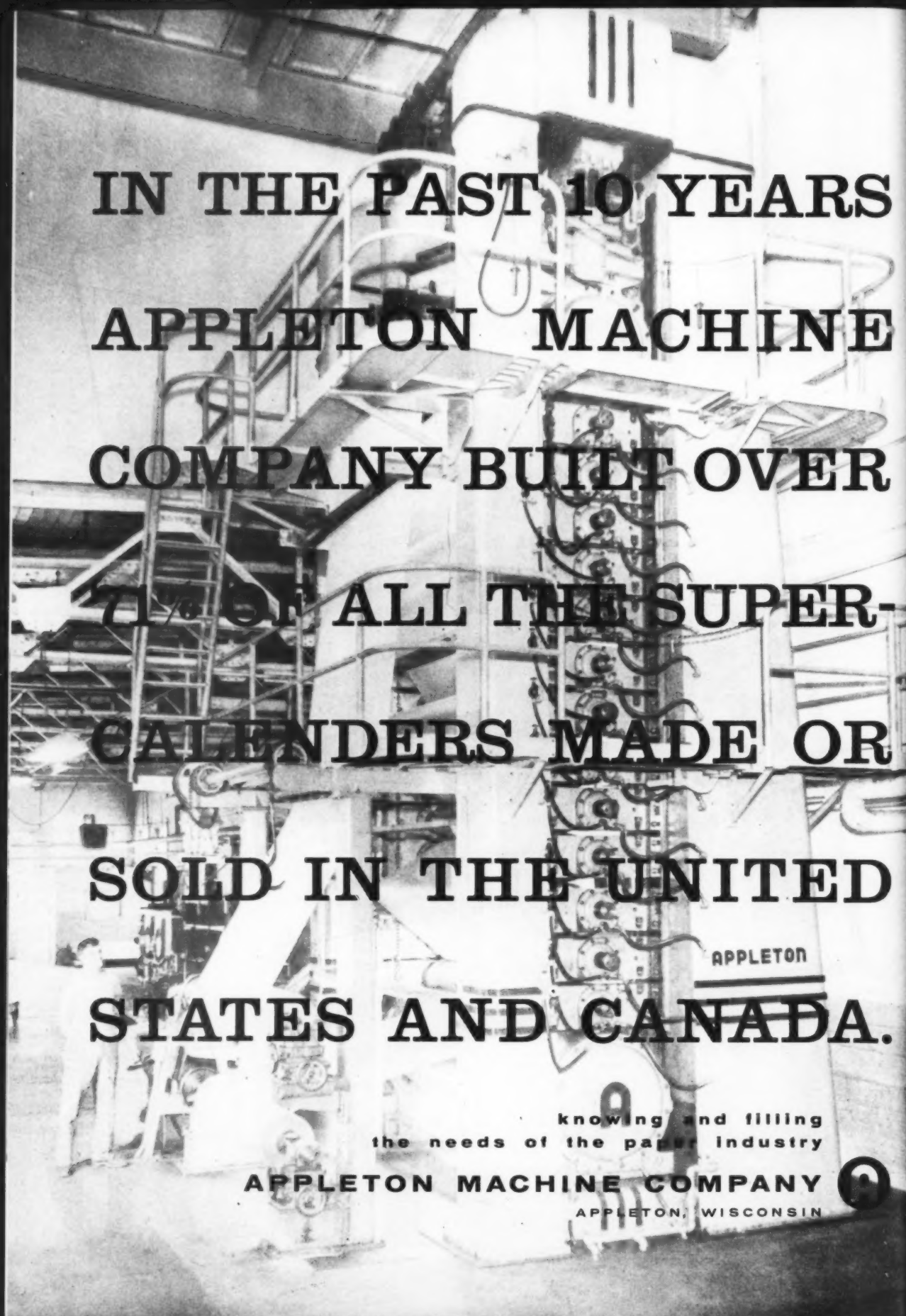
DRAPER BROTHERS COMPANY

John H. Draper, Jr.

President

1856 Our 100th Anniversary 1956

★★★★★ 1956


IN THE PAST 10 YEARS
APPLETON MACHINE
COMPANY BUILT OVER
71% OF ALL THE SUPER-
CALENDERS MADE OR
SOLD IN THE UNITED
STATES AND CANADA.
APPLETON
knowing and filling
the needs of the paper industry
APPLETON MACHINE COMPANY
APPLETON, WISCONSIN

Methods of applying coatings

The second of a series of ten articles on the technology of paper coating

The most common form in which organic coatings are applied to paper is that of solvent solutions generally called varnishes or lacquers. In order for a coating composition to be applied by this method, it must be quite soluble in common solvents and the resulting solution must have a relatively low viscosity at fairly high solids contents.

The types of resins used in spirit varnishes are soluble in alcohol or alcohol-hydrocarbon combinations. Solutions with solids contents as high as 50 per cent may be made without attaining very high viscosities. Vinyl resins and nitrocellulose, on the other hand, require expensive solvents such as ketones and esters; and solutions cannot be made with solids concentrations much above 20-25 per cent. Nevertheless, the properties these resins impart are sufficiently important to overcome these inherent disadvantages, thus making their use advantageous in many applications.

In large operations where varnishes and lacquers are used extensively, solvent recovery systems may be installed so that economies may be effected by reuse of the solvent.

Varnishes must also be stable for extended periods at room temperature and at the lower temperatures which might be encountered during shipping. Gelation at low temperatures is very undesirable since this may ruin the coating entirely or at least make it necessary to warm the varnish to achieve solution before it can be used on a coating machine.

Gelled solutions of vinyl resins may be applied to paper by special calendering processes, which however are specialty type applications not in general use.

Water dispersions, emulsions and organosols

Water dispersions and emulsion coatings have an obvious advantage over solutions in that solvent costs are eliminated. They generally have relatively high solids concentrations while still maintaining low viscosities. They also tend to give good adhesion to surfaces which are receptive to hydrophylic materials. Varnishes and lacquers, on the other hand, give better adhesion to surfaces which are readily wetted by hydrophobic products. Water dispersions and emulsions have an advantage in the coating of porous papers since they tend to give films with better "standout". A further advantage they have is the elimination of a fire hazard and toxic characteristics often associated with a coating solution. On the other hand, they are not recommended unless adequate drying facilities are available.

When using water dispersions or emulsions as coatings, it is often desirable that a continuous film of the coating be obtained. Continuous films can practically always be expected when the coating is laid down from solvents. Water dispersions, on the other hand, especially those which consist of solid particles dispersed in water, tend to give discontinuous films and these must frequently be fused by the application of heat. The inclusion of some solvent or plasticizer in the emulsion formulation will help in providing continuous films.

Organosols, like water dispersions, are colloidal systems. The dispersing medium, however, is an organic liquid instead of water. Obviously, the organic liquid must be a non-solvent for the material which is to be dispersed. Ordinarily organosols lay down discontinuous films, for which reason fusion is required.

Plastisols are similar to organosols, but the dispersing medium here is a non-solvent plasticizer. Plastisols are dispersions of vinyl resins in plasticizers. They are not too widely used on paper because of the extremely high temperatures required for fusion of the plasticizer and the resin. Such high temperatures not only involve undue expense, but also tend to weaken the paper due to dehydration.

Hot melt coatings

The use of hot melt coatings involves heating the coating compositions until a fluid is obtained and then applying this melt directly to the paper. This method has the obvious advantage of elimination of both solvents and water and accordingly it is frequently the cheapest procedure for coating paper. The danger of solvent retention is completely eliminated and films with a high degree of continuity are obtainable. Drying facilities are obviously not required, although chill rolls may be necessary in order to cool the coating so that it will not be tacky.

Hot melt coating is most commonly used with waxes which melt to give highly fluid compositions. Most resins, by virtue of their polymeric nature, do not give very fluid melts, even though they are thermoplastic. Accordingly, most wax coating machines cannot be used with resinous hot melts, and modified equipment is necessary.

A variation of hot melt coating is extrusion coating. Here resinous material such as saran, nylon, and polyethylene may be extruded onto paper.

*On-the-machine coating methods**

It is estimated that currently some 1,300,000,000 tons of paper are coated annually on the paper machine and about 300,000 tons by converters.

The popularity of on-the-machine coating methods is due to the economy involved, since it permits (1) more efficient drying, (2) simultaneous coating of both sides, (3) the use of high solids coatings, thereby eleminating the need for the evaporation of large volumes of liquids, and (4) the output of a high tonnage of coated paper per dollar invested in coating equipment.

The size press, usually a simple two- or three-roll size press, is the oldest and most common method of applying coatings on the paper machine. It permits an application as high as 8 lbs.** per ream using a coating with a solids content of 35-50 per cent. However, almost invariably, size press coating requires a high starch adhesive to pigment ratio.

In size press coating, the sizing may be showered, in a double shower arrangement, on top of the web and on the surface of the bottom roll from which it is subsequently squeezed to the sheet. A dip method is also in use in which the bottom roll picks up the coating while the top of the sheet is sized with a shower arrangement. This method, however, has disadvantages, since it may result in unequal sizing and in

*Based on a paper presented by G. L. Booth, Black-Clawson Co., at the Seventh TAPPI Coating Conference.

**Coating weights are based on a book ream size 25 x 38—500.

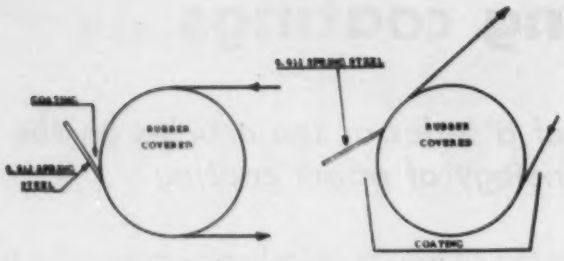


Fig. 1. Rice-Barton Trailing Blade Coater

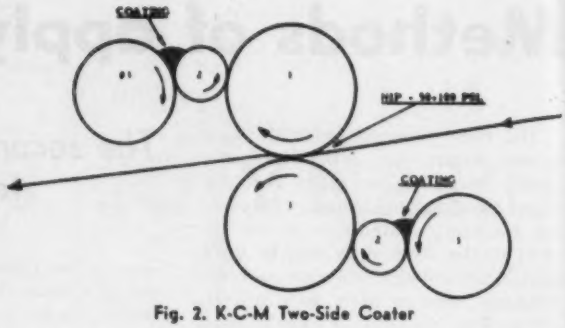


Fig. 2. K-C-M Two-Side Coater

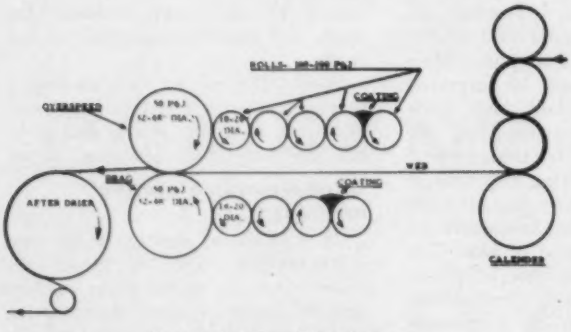


Fig. 3. The Consolidated Coater

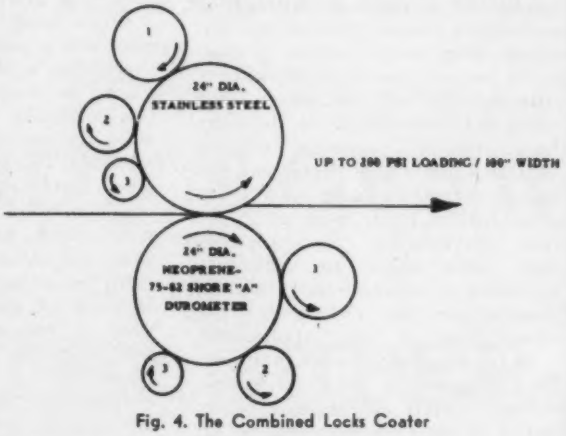


Fig. 4. The Combined Locks Coater

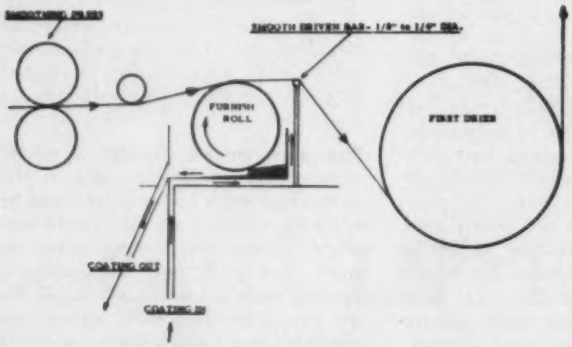


Fig. 5. The Champion Coater

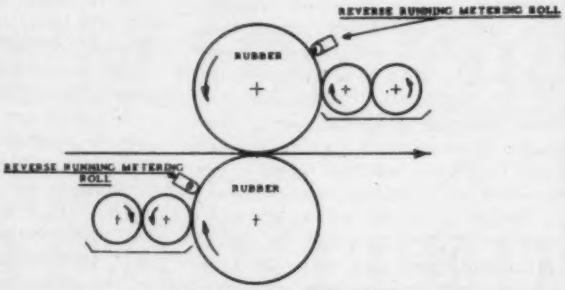


Fig. 6. Gate Roll Coater

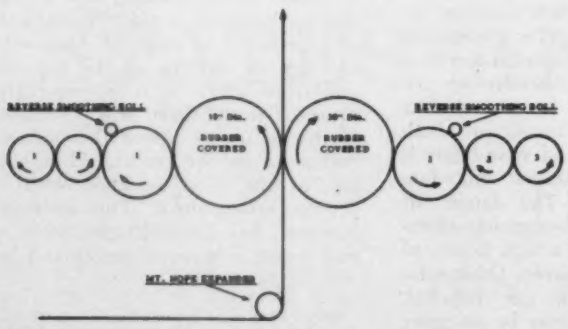


Fig. 7. West Virginia Coater

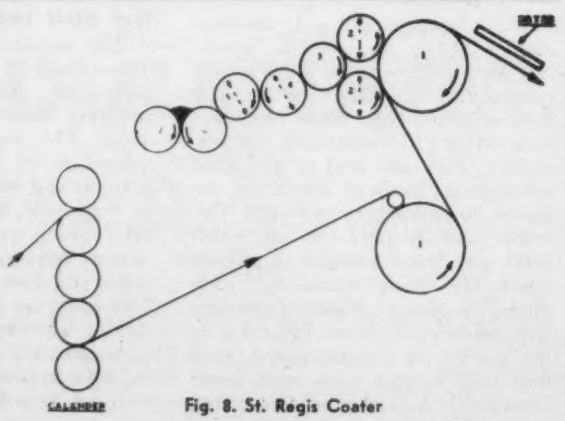


Fig. 8. St. Regis Coater

the formation of coating ribs on the bottom roll which picks up the coating. The method is improved when a small furnish roll is used to pick up the coating from the pan and apply it to the bottom roll.

The bottom roll is usually a rubber covered roll with a hardness of 25-30 P&J. It is motor-driven, while the top roll is driven by contact with the bottom roll. Where the top roll is individually driven, it can be run at a differential speed from the bottom roll in order to control the contact area of the sheet on the rolls. The top roll can be made of bronze, chilled cast iron, chrome-plated chilled cast iron, or stonite.

After the sheet is sized it is run from 10 to 20 ft. unsupported to a smaller dryer roll operated at relatively low temperature. It is unsually necessary to doctor the first few dryer rolls because of coating build-up.

The offset gravure method can be run at 1200 fpm with uniform coating weight control. It does not permit, however, an application of a wide range of coating weights with approximately the same coating solids content unless rolls are used with different gravure patterns. A gravure roll can be replated three times before it has to be reengraved, provided it is not run until the copper plating shows through.

The gravure coater is usually installed near the end of the paper machine where the sheet is nearly dry. Coatings of 65 per cent solids can be handled by this coater, and coating weights applied are 4-15 lb. per ream.

The "Trist" or "Trailing Blade" coater (Fig. 1) can be operated at speeds in excess of 2000 fpm, and coatings can be used with solids contents of 35-60 per cent resulting in coating weight applications of 1½-5 lb. per ream. Coating weights are controlled by varying the solids content and the flow properties of the coating. Blades last 24-30 hrs.

The method is used for waxing tissues and it has also been adapted to the coating of some book papers. However, it does not permit a simultaneous application of the coating to both sides of the sheet.

The Kimberly-Clark-Mead coater consists of four rolls and is used for a one side coating operation. It can handle coatings up to 65 per cent solids and coating weights from 7-20 lb. per ream on each side can be applied. The coater can operate at speeds approaching 1200 fpm, although there is danger of causing an increasing patterning of the coating at the higher speeds due to the squeeze metering nips.

The principle incorporated in the design of this machine is a small diameter roll located between two large diameter rolls, which causes a smoothing of the coating, due to the higher break away angle of the coating at the point where it splits between the nip of these rolls. About 75 per cent of the coating is picked off the rubber roll by the sheet. This is an extremely versatile machine and can be used on board, book, and offset sheets. The coater is also modified for simultaneous two side coating application (Fig. 2).

The Consolidated (Massey) process (Fig. 3) is one of the best known machine coating methods in use today. It is a print roll coater with several squeeze nips in which the coating is continually split and worked from one roll to another. This coater can handle solids up to 65 per cent and has a speed range of 600-1000 fpm. Nip patterning makes it difficult to run the coater at higher speeds. Slight changes in temperature of the coating resulting in different flow properties can result in different coating weight deposit on the edges and sometimes very definite patterning at these points. To maintain a uniform coating nip it is usually necessary to use a distributing type feed to the nips or to overflow the coating at the edge of the gate rolls. The amount of coating that can be applied by this coater varies from 6-20 lb. per ream.

The Combined Locks machine coater (Fig. 4) is a print roll coater capable of handling solids up to about 65 per cent and applying coating weights of 6-20 lb. per ream. It is used for coating offset and book papers. The coater has an oscillating reverse smoothing roll which tends to eliminate all the nip patterning resulting from squeeze coating while the coating is still on the applicator roll. It does not, however, eliminate the nip patterning that may result after the coating has been applied.

The Champion coater (Fig. 5) is used by many board manufacturers. This coater has a simple construction design and consequently requires a relatively low capital investment. It consists of a furnish roll followed by a driven smoothing bar to meter and smooth the amount of coating applied. It takes up very little space in the dryer section where as many as five such coating stations can be installed to apply the coating to one or both sides of the sheet. The first installation is usually made at a point where the paper is about 50 per cent dry, while the second station is installed at a point where the paper is about 60-75 per cent dry. The coater operates at 150-600 fpm, applying coating weights of 1½-6 lb. per ream. It handles coatings of 40-45 per cent solids.

The gate roll type Champion coater, (Fig. 6) one of the most newly patented methods, features non-metering gate rolls and a very small reverse running metering rod operating against this applicator roll. It is believed that this coater handles coatings up to 65 per cent solids and applies coating weights in the normal range of 6-20 lb. per ream per side.

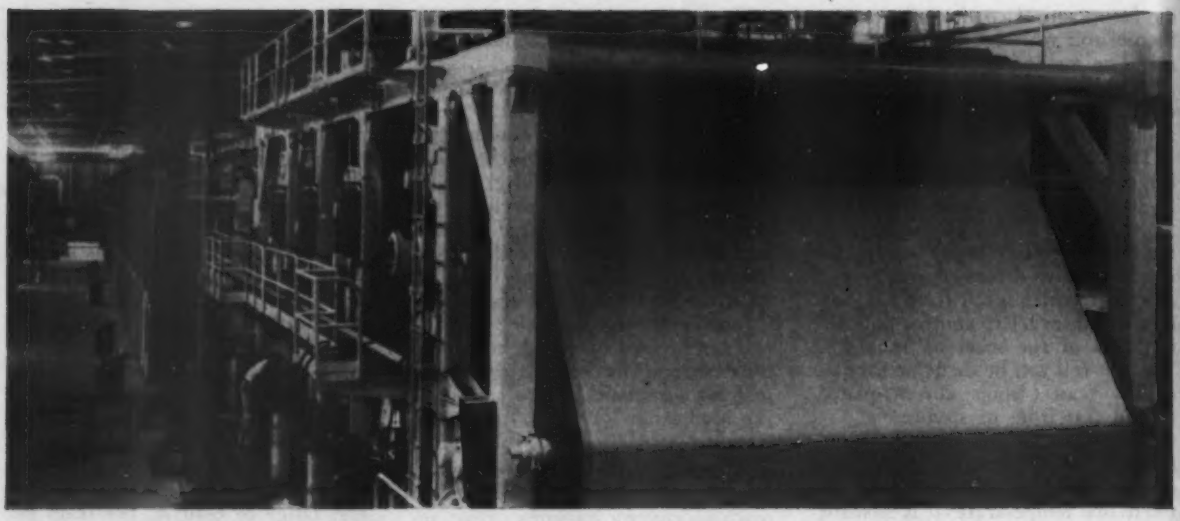
The West Virginia coater (Fig. 7) is a print roll coater featuring a reverse running small diameter smoothing roll which is used on one of the transfer rolls. The smoothed coating on the transfer roll is then transferred to the applicator roll. Squeeze metering nips are used for coating weight control. The coater can handle coatings up to 65 per cent solids and apply coating weights from 6-20 lb. per ream per side.

The St. Regis coater (Fig. 8) is a modification of the overly complicated Faeber coater which uses 17 rolls for applying the coating to one side of the sheet. The St. Regis coater has fewer rolls. While the Faeber coater uses a steel drum about 7 ft. in diameter, around which are arranged high temperature gas dryers for flash drying of the coating, the St. Regis coater has a soft backing roll at this point.

The Air Knife coater operates on the principle of applying an excessive amount of coating to the paper and then doctoring it off to the desired weight and the desired coating surface. The coater uses air pressures ranging from 1½-5 psi in the air doctor.

Solids contents of the coatings used on the Air Knife coater normally range from 5-40 per cent, although in some cases coatings have been used with solids contents as high as 50 per cent. Coating weights range from 1-20 lb. per ream.

This method is not too applicable to machine coating of paper because of the low solids content of the coating. It can be used, however, on board machines because of the greater ability of the board to soak up water from the coating.



The Beloit five-cylinder board machine featuring adjustable vats and counter and uniflow of stock

Crossett's five-cylinder machine

Part II

THE HIGHLIGHT OF Crossett Paper Mills' recently completed $16,000,000 expansion is the five-cylinder board machine with adjustable vats and provision to run the stock either counterflow or uniflow, thus permitting greatest flexibility of stock flow and lending uniformity to caliper and basis weight of the board produced.

The 216-in. cylinder board machine has a drive speed that presently limits machine speed to 450 fpm. However, the machine is mechanically designed and balanced for considerably increased speeds in the future.

The machine is designed to produce daily 150 tons of a wide variety of high-grade bleached food board and specialties in the range of 0.011-0.040 caliper.

Stock preparation

The stock preparation system is designed to handle three different types of stocks to the machine, namely, liner, filler and broke. (Diagram 1).

Pulp, consisting of fully bleached neutral sulfite semichemical hardwood, semi-bleached pine sulfate and fully bleached pine sulfate, is pumped at 3.5 per cent consistency from the three 125-ton high-density storage tanks through consistency regulators into three 11-1/3- by 31½- by 18¼-ft. tile-lined beater storage chests equipped with agitators and drives.

The fully bleached and the semi-bleached sulfate pulps then pass through two No. 6 Hydrafiners (in parallel), then through two consistency regulators into a partitioned constant-level box which also receives the hardwood pulp and some broke directly from the NSSC beater storage tank and the broke storage tank. From the constant level box, the three pulps are measured in the desired quantity into a proportioning box, where they are thoroughly mixed.

From the proportioning box the pulp is fed to either (1) a liner dump chest or (2) the filler machine chest. From the liner dump chest, liner stock is pumped into a vertical blending chest where color and other additives are added. Blended liner stock then goes to the liner machine chest. All chests are equipped with horizontal propeller agitators and drives.

An automatic continuous system prepares dilute rosin size, alum and starch for addition to the three stocks.

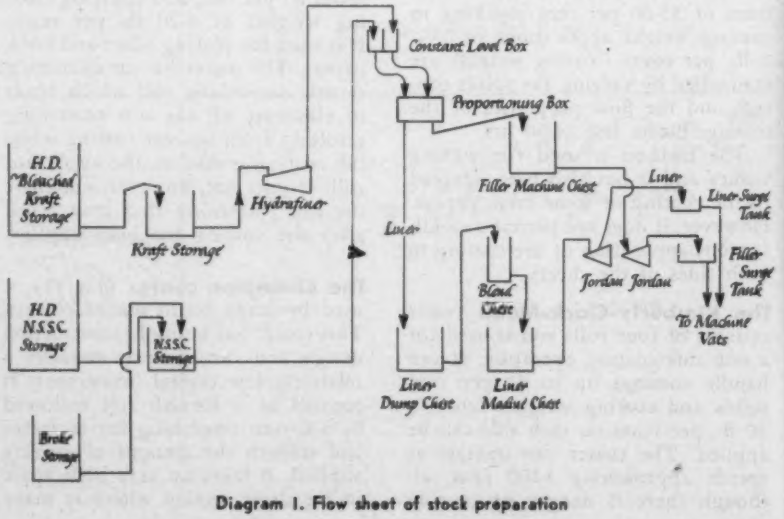
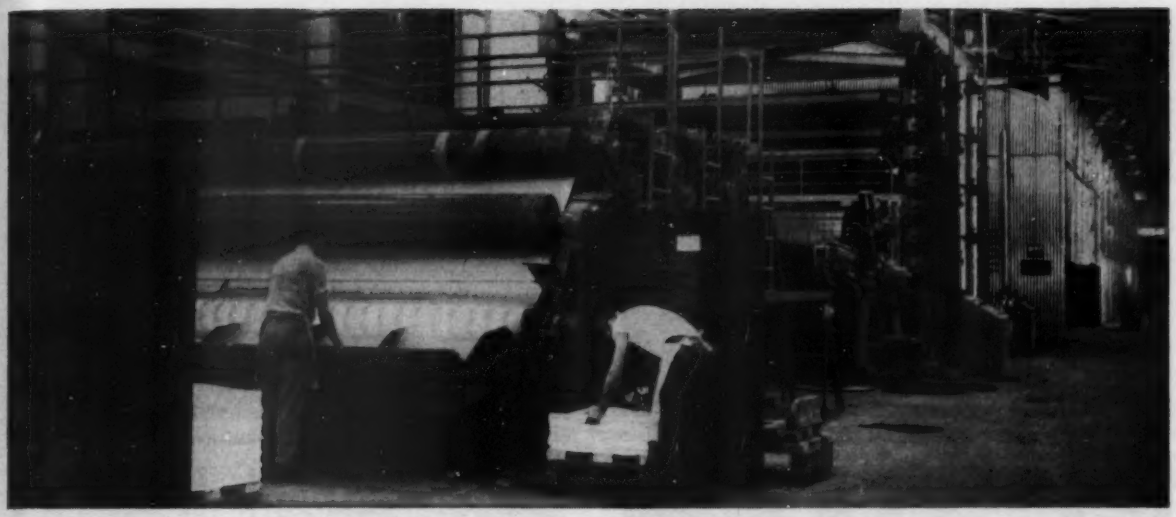


Diagram 1. Flow sheet of stock preparation



Dry end of cylinder board machine showing Ross hood, Beloit calenders and cutter

Starch is cooked in a continuous automatic starch cooker equipped with flow meters, flow regulators and pneumatic indicating temperature controller. During the cooking operation, the starch slurry flows successively through three stainless steel compartments: a cooking tank, cooling tank and a storage tank. The cooking tank is maintained at the desired temperature by automatically-controlled steam nozzles, while the mechanical agitation in the tank pulls the incoming starch suspension down into the hot contents of the tank to insure complete starch gelatin. Rosin size is emulsified in an automatic emulsifier with a capacity to handle up to 30,000 lbs. of 80-per cent solids size in 24 hours and delivering a consistently uniform emulsion of up to 5 per cent solids. Alum is fed into the stock system by two model RDL-1 Rotodip feeders, each with a capacity of 150 gal. per hour of a 32-degree Baume alum solution having a specific gravity of 1.2832 at 60° F. The discharge box and outlet pipe of each unit is sized to allow dilution at this point to a 9-degree Baume alum solution. Each feeder is driven by a ¼-hp motor through a variable speed transmission having a 100:1 range. The tanks of these particular feeders are lead-lined, and the dipper wheels are of cast lead. A mechanical totalizer records the revolutions of the dipper wheels, from which the total gallons fed can be readily determined. The feeding range of the Rotodip is from 0 to 1800 gallons per hour.

Liner and filler stocks are pumped from their respective machine chests to two No. 6 Miami jordans, to the stainless steel liner and filler surge tanks, from where they are pumped to the vats of the multiple-cylinder machine.

Broke can be added to the proportioning box, or into the filler system, or directly to each cylinder vat.

The cylinder board machine

The liner and filler stocks are circulated from their respective stainless steel surge tanks in two continuous loops to any one of the five vats, from which five 24-in. 12,000-gpm centrifugal fan pumps circulate the stocks to the five cylinder molds. A third continuous loop is available to deliver broke separately to the individual vats. White water from the cylinders is pumped to an 8- by 16-ft. vacuum saveall featuring underjet discharge.

Each of the five vats is fitted with a 60-in. cylinder mold. The vat design is special in that provision has been made for operating in either the

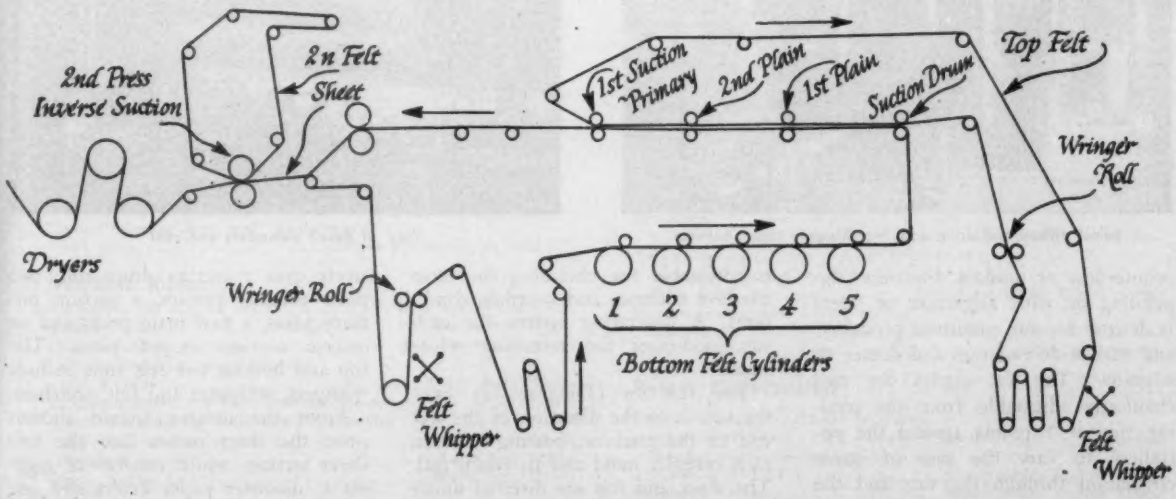
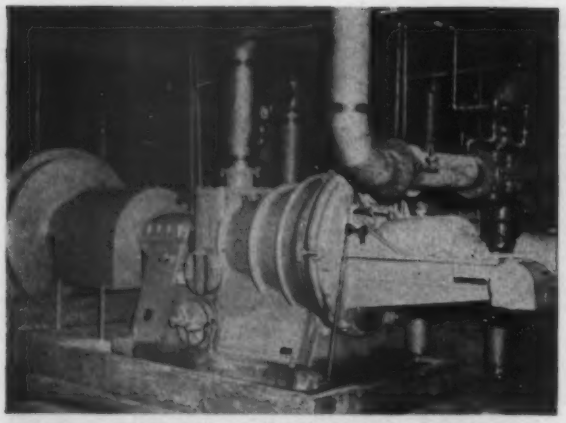
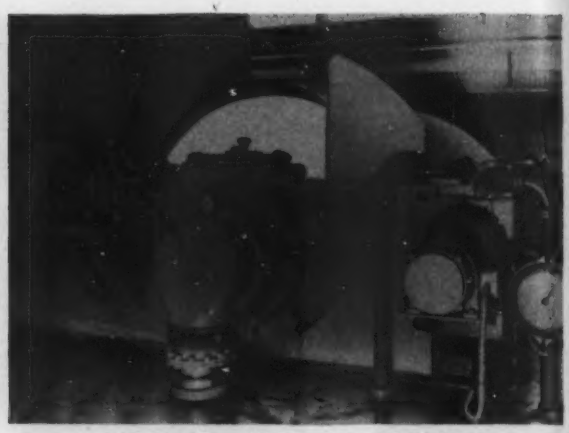


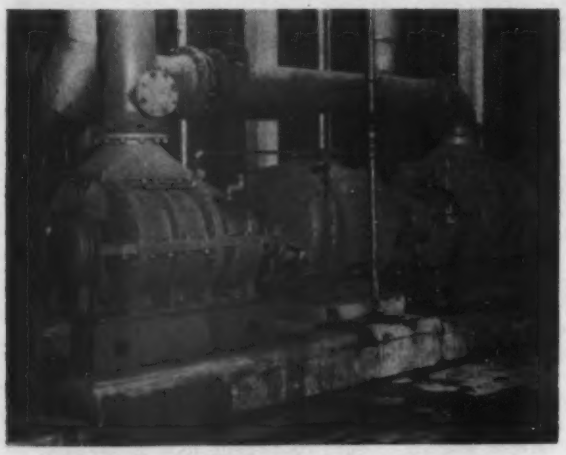
Diagram 2. Cylinder machine, felt runs, and press section



Black-Clawson Miami No. 6 jordan



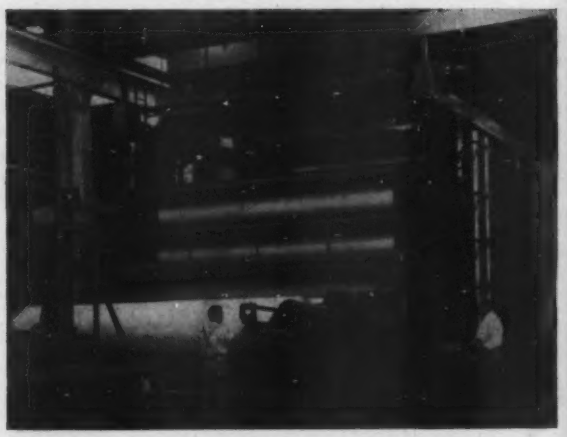
Impco broke saveall with underjet discharge



Roots-Connersville compound unit vacuum pump

Goulds 12,000 gpm fan pump

Beloit differential drive and Worthington steam turbine



View of Beloit calenders and reel

counterflow or uniflow direction (depending on what alignment of fibers is desired for any particular product), and with wide variation and degree of overflow. The vat circles are mechanically adjustable from the tending side at 5 points around the periphery to vary the rate of stock circulation through the vats and the degree of overflow. The making board is adjustable for obtaining the most effective entrance and overflow conditions. A deaerating system for each vat conditions the returning white water.

The felt-run (Diagram 2) over the vats is in the direction of the wet end of the machine, passing between each cylinder mold and its couch roll. The sheet and felt are directed under a turning roll and then pass successively over a suction drum roll, two plain primary presses, a suction primary press, a first main press and an inverse suction second press. The top and bottom wet felt runs include wringers, whippers and felt stretchers.

From the inverse second suction press the sheet passes into the first dryer section, which consists of eight 60-in. diameter paper dryers and one felt dryer.

All dryers are 60 in. in diameter and 230-in. face, designed to operate at 75 psi and 320° F. Each dryer is equipped with anti-friction bearings; front dryer bearing housings are designed to allow for expansion and contraction. Each dryer is further equipped with balanced steam fits and condensate removers, and carbons are designed so that they can be changed on the run. The entire dryer section is equipped with a sheahan rope carrying system.

The dryer system is divided into four sections. The first section consists of six paper dryer rolls and one felt dryer roll. The second section is made up of 16 paper dryers and three felt dryers. The third section has 16 paper dryers and two felt dryers and the fourth section eight paper dryers and one felt dryer.

A hot press is located between the first and the second dryer sections; a braker stack between the second and the third dryer sections, and a size press between the third and the fourth dryer sections.

The entire machine is lubricated by a special roll filter lubrication system.

In a tile chest under the dry end of the paper machine is installed an extended No. 4 size Pulp Master unit. It is driven by a 200-hp motor, direct connected to a gear reducer. The Pulp Master is centered under the calender stack. The broke from the calender falls directly into the Pulp Master, while the broke from the reel slides down a chute, and the broke from the dryer sections is fed to the pulper by means of a long slider belt type conveyor.

The machine drive

The machine is driven through differential drive units, which mechanically lock the various sections of the machine together for positive control of draws, by a 450-hp steam turbine located in line with the differential drive units. This leaves the basement completely clear of drive parts. The turbine operates at 350 psi, exhausting at 75 psi. It is equipped with a direct governor, for operation over a 6:1 speed range, and remote control speed adjustment.

A carefully designed electric helper drive arrangement is used to maintain uniform felt tensions on the wet felts.

The clutches are of the latest multiple disc air-operated type, with all

(Continued on page 223)

Principal equipment and suppliers at Crossett's No. 2 mill

Stock Preparation

Alum Pumps (4), 5 gpm and 10 gpm	Duriron Co. Inc.
Broke refiner	Black-Clawson Co.
Broke vacuum saveall, 8 by 16 ft. with underjet discharge	Improved Machinery Inc.
Emulsifier system, automatic, 30,000 lb. daily capacity	Hercules Powder Co.
Filler machine chest with Shartle agitator and drive	Stebbins Engineering & Mfg. Co.
Consistency regulators (3), pressure type	DeZurik Shower Co.
Hydrafiners (3), two No. 6 and one No. 00	Black-Clawson Co.
Instruments	Panellit Inc., Fischer & Porter Co., Black-Clawson Co.
Jordans (3), No. 6 Miami	Black-Clawson Co.
Liner dump chest with Shartle agitator and drive	Stebbins Engineering & Mfg. Co.
Liner machine chest with Shartle agitator and drive	Stebbins Engineering & Mfg. Co.
Motors (50)	Reliance Electric & Engineering Co.
Motor controls (5), three for control of 350 hp synchronous motors driving the jordans and two for control of 350 hp synchronous motors driving the hydrafiners	Westinghouse Electric Corp.
Pumps (bleached kraft, NSSC, semi-bleached kraft, and broke stocks)	Black-Clawson Co.
Pumps (2), one 2600 gpm broke pump to broke saveall pump and one 500 gpm broke pump to broke chest pump	Goulds Pumps Inc.
Pumps (20), liner and filler stocks	Black-Clawson Co.
Pumps (4), 2500 gpm and 1200 gpm	Warren Steam Pump Co. Inc.
Regulators (bleached kraft, semi-bleached kraft, and bleached NSSC stocks)	Black-Clawson Co.
Rotodip feeders, (2), lead-lined, 150 gph, with totalizer	Omega Machine Co. Inc.
Starch cooker, continuous—automatic	Henry Pratt Co.
Stock proportioning system	Black-Clawson Co.
Surge chests (4), tile, 11½ by 31½ by 18¼ ft.	Stebbins Engineering & Mfg. Co.
Vertical blending chest, with Shartle agitator and drive	Stebbins Engineering & Mfg. Co.

Machine Room

Air Supply fan	J. O. Ross Engineering Corp.
Breaker stack	Beloit Iron Works
Calender cooling system	J. O. Ross Engineering Corp.
Calender stacks (2), one 7 rolls and one 8 rolls	Beloit Iron Works
Cylinder machine, five 60-in. diameter cylinders with adjustable vats designed for counterflow and uniflow direction of stock	Beloit Iron Works
Condensate removers	Beloit Iron Works
Cutter, duplex type	Beloit Iron Works
Cranes (2), one machine room 40T span 57½ ft., one reel 20-ton	Manning, Maxwell & Moore Inc.
Deaerating vats	Stebbins Engineering & Mfg. Co.
Dryer sections (4), total of 52 paper and felt dryers of 60-in. diameter	Beloit Iron Works
Economizer, Briner type	J. O. Ross Engineering Corp.
Exhaust fans (2)	J. O. Ross Engineering Corp.
Felt stretchers	Mount Hope Machinery Co.
Felt whippers	Beloit Iron Works
Felt wringers	Beloit Iron Works
Heating and ventilating system	J. O. Ross Engineering Corp.
Hot press	Beloit Iron Works
Instrument control system	Panellit Inc.
Lowering table	Beloit Iron Works
Lubrication system, special roll filter	Beloit Iron Works
Machine drive, differential drive unit type	Beloit Iron Works
Machine hood, totally enclosed	J. O. Ross Engineering Corp.
Motors (40)	Reliance Electric & Engineering Co.
Motors (57)	supplied by Beloit Iron Works
Press section, suction drum, suction primary, 1st and 2nd primary, 1st plain, inverse suction	Beloit Iron Works
Pulp master, No. 4, 150 tons per day capacity	E. D. Jones & Sons Co.
Reel, constant speed board type with double action air cylinders	Beloit Iron Works
Roll ejector	Beloit Iron Works
Roll heading machine, 60 in. by 16-76 in.	Valley Iron Works
Shaft puller	Beloit Iron Works
Size press	Beloit Iron Works
Suction system, for duplex cutter	J. O. Ross Engineering Corp.
Steam turbine, 450 hp, 350 psi pressure with remote control speed adjustment	Worthington Corp.
Trim conveying system, from cutter and rewinder to broke chest	J. O. Ross Engineering Corp.
Unwinding stand, with air operated brakes	Beloit Iron Works
Fan pumps (5), 24-in. centrifugal, 12,000 gpm, 20-ft. head	Goulds Pumps Inc.
Vacuum pumps (2), one 16 by 32 by 14 by 21 compound unit and one 16 by 36 single stage unit	Roots-Connersville Blower Corp.
Wet broke chest, with Shartle agitator and drive	Stebbins Engineering & Mfg. Co.
Winder, model "L" type	Beloit Iron Works

Power Distribution

Substations (12), ten 750-kva for voltage transformation from 13,800 v to 480 v, and two 2000-kva for voltage transformation from 13,800 v to 2400 v	Westinghouse Electric Corp.
Switchgear, 15 kv	Westinghouse Electric Corp.

Xatron drives for the pulp and paper industry*

R. T. WILLARD** and
M. H. PHELPS

▶Electronic units for powering variable speed motors gain favor through efficiency and low costs

UNTIL THE END of World War II, practically all industrial electric adjustable-speed drives used the Ward-Leonard System of varying voltage to obtain varying speeds. This method uses an ac motor to drive a dc generator which supplies the variable-voltage dc power to a variable-speed drive motor. This method accounts for at least 90 per cent of actual variable-speed electric drives installed in U.S. industry today, and is the muscle of our most automated present day factories.

Various types of electronic rectifier tubes were available, such as thyratrons, ignitrons, and excitrons, but they were all for below 30 hp and over 200 hp ranges. There were no commercially available rectifiers for the extremely important range of 30 to 100 hp, where a vast number of variable-speed drives are used and can be used.

Drive development

Developments began on a rectifier tube which would be the nucleus of a commercially practical electronic drive for the medium power range of 30-50 hp. It was evident that a three-phase rectifier would be ncessary at this power level, and use of a bridge type rectifier was most appealing from an economic standpoint. Elimination of a costly and heavy input transformer was one great advantage. Another advantage concerned the size of the drive motor. It was usually necessary, when operating on rectified power, to jump to the next larger drive motor frame size, to offset additional heating. The Xatron rectifier produced such a close approximation to pure dc that no additional heating was produced. This eliminated the need for going to the next higher motor frame size—a decided advantage not only for cost but also size. A drive was perfected which used six of the new rectifier tubes, by then assuming the name "Xatron Tubes", firing twice during each cycle. Heavy currents were successfully handled and an electronic drive for the 30-50 hp range became not only possible, but economically feasible.

The first of the Xatron Drives was installed at an automotive plant. Since that time, several hundred drives have been applied in various industries with excellent success. Five 40 hp Xatron Drives are in operation on the pulp washers of the recently completed bleached food board mill at Crossett, Ark.

Drive performance

The Xatron Drive operates directly from a three-phase, ac source incorporating six Xatron power tubes connected in a full-wave three-phase bridge rectifier circuit to convert the ac to controlled adjustable dc. To accomplish smooth acceleration from rest to full speed, the field is held constant while armature voltage is increased—dictating a proportionate increase in motor speed. This speed increase is linear with respect to time, and an adjustment is provided to allow a range of linear voltage time acceleration to a preset speed.

Power deceleration as also provided by the adjustable linear voltage time feature, to bring the speed down in the desired time. Emergency stops are possible with dynamic braking.

Xatron tubes are capable of handling high currents for short periods, but the critical factor is the average current. Current limit and overload protection restrict operation to within prescribed limits. A standard feature is current limit acceleration which protects against excessive armature currents during load changes. It permits rapid acceleration, but limits it to the maximum safe value.

A speed range of 8:1 is standard for continuous operation with 32:1 available if required. IR drop compensation is incorporated, which compensates for speed changes that would ordinarily occur with load changes. Additional voltage is supplied that compensates for the voltage loss in the motor under heavy load.

Industrial construction

Sealpak construction is used, whereby each main electronic circuit is individually assembled, wired, and sealed in plastic in its own metal container. All external connections to the Sealpak Units are made to screw-type terminals. The units are pre-tested, use high-reliability electronic tubes, and afford extra protection and simplified maintenance. Metal-encased and sealed in plastic, the Sealpak circuit is protected from dirt, corrosive atmospheres, vibration, and shock. And the grouping of circuits into easily identified units provides for immediate location of a fault, also allowing extremely rapid correction by single replacement of the faulty Sealpak.

Applications

The ability to apply power to the drive motor instantly (electronically) is an advantage over the Ward-Leonard System on many applications. The time constant (L/R) of the drive motor, its inertia (WR^2), and the inertia of its connected load (WR^2) become the determining factors in the speed of response of the drive—thus eliminating the time constant of a dc generator. A typical application calling for this rapid response was that of a drive on an aircraft auxiliary test stand.

The drive on this application was used for powering aircraft oil pump test equipment. The motor accelerated to 1750 rpm operating speed under no load, and was zero speed regulated through the use of the electronic compounding circuit. Then, full load of 50 hp was applied within 0.05

*Condensed from a paper presented at the Annual Meeting of the AIEE Pulp & Paper Section, Gainesville, Fla., March 8-9, 1956.

**Mr. Willard is branch manager, Birmingham, and Mr. Phelps is application engineer of Reliance Electric & Engineering Co.

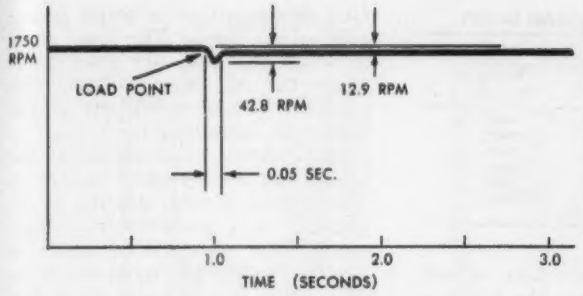


Fig. 1. Effect of a suddenly applied full load (Xatron Drive at full speed)

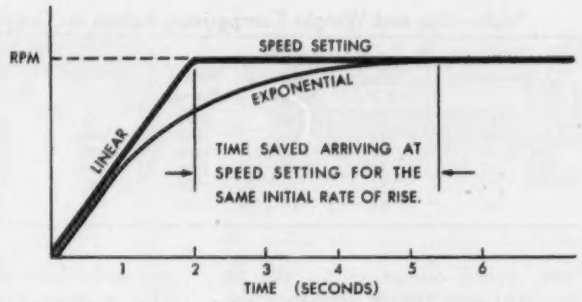


Fig. 2. Comparison between acceleration rates (linear and exponential)

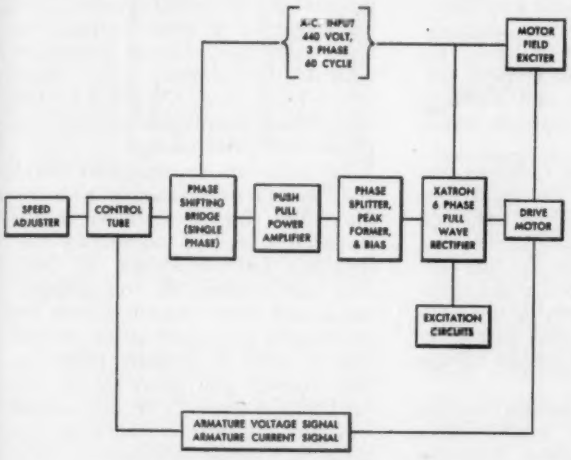


Fig. 3. Xatron Drive function diagram

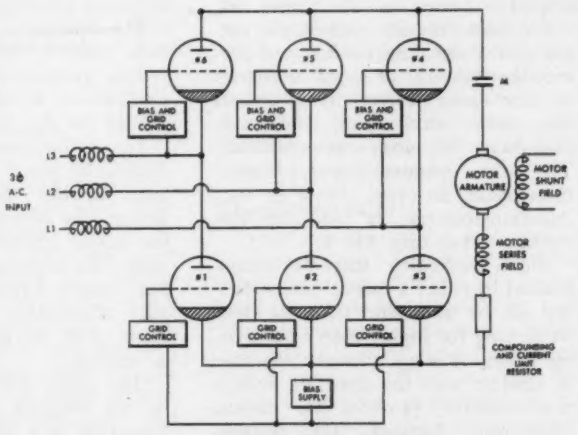


Fig. 4. Xatron three-phrase full wave bridge rectifier

seconds—a shock load. Recordings were taken and it was found that the speed dropped off and recovered to within 0.74 per cent of its original no-load speed within 0.5 seconds. Fig. 1 illustrates this speed of response graphically. This was accomplished through the use of the IR drop compensation circuit only.

When a sudden lurch followed by a non-linear rate of rise in speed cannot be tolerated on an application, smoothly applied power becomes a necessity. Many examples of this requisite may be found in the pulp and paper industry as well as in the printing industry. Paper machines are perhaps the best example. Web breakage can be costly, from the standpoint of "down time" causing loss of production; and clearing and rethreading the machine is a time-consuming task.

One of the electronic Sealpak circuits permits only linear acceleration and deceleration of the drive motor or motors. Two adjustments are provided—one for acceleration, one for deceleration—which afford a range of time for the motor to linearly reach a preset speed from an initial speed. Basically, the change in power applied to the motor is proportional to the charge or discharge (acceleration or deceleration) of a capacitor. However, instead of the exponential charge or discharge (non-linear acceleration or deceleration) which would be expected, a constant current device intercedes to permit only a linear rate, Fig. 2.

An installation at The Whiting-Plover Pulp & Paper Co. (Stevens Point, Wis.) of a 75 hp Xatron Drive was completed in November, 1955, and has proved to be highly successful. Advantages over the old system were closely apparent in only a short time.

Comparisons were made between the former installation and the new one on the basis of the first two months of operation. The operating cost of making paper (combined labor, maintenance, and power cost) had formerly been $.12 per thousand ft. of paper. The Xatron Drive decreased the cost to $.09 per thousand ft.—a 25 per cent reduction. At this rate, the drive could pay for itself, through operating cost savings alone, in a little over two years of continuous six days per week operation.

Installation of the drive was a simple matter because there were no requirements for special foundation, alignment, balancing, or shimming. Heavy handling equipment was unnecessary with the control unit weight of only 1200 lb., compared to 5000 lb. for a conventional drive and the old steam engine weight of approximately 7000 lb. Floor space requirements were only 10 sq. ft. for the Xatron Drive Control Unit compared to about 170 sq. ft. for the steam engine. Only a short run of electrical conduit was needed, and the drive motor was direct-connected to the paper machine drive shaft.

Theory of operation

Functionally, the Xatron Drive consists of an electronic rectifier whose voltage may be varied to supply the armature power of a 30 to 100 hp adjustable-speed drive motor, and an electronic exciter for the motor field.

The output of the armature rectifier is a controlled variable voltage having a six phase 360 cycle ripple. It is variable from 0 to 500 v at full

Table—Size and Weight Comparison, Xatron vs. Conventional Drives

Horsepower	Xatron			Conventional		
	Volume (Cu. ft.)	Area (Sq. ft.)	Weight (Pounds)	Volume (Cu. ft.)	Area (Sq. ft.)	Weight (Pounds)
30	51	10	1200	51	10	2000
40	51	10	1200	184	27	4000
50	51	10	1200	184	27	4000
60	51	10	1200	184	27	4500
75	51	10	1200	184	27	5000
100	51	10	1200	192	29	6000

load current ratings of 51, 67, 84, 101, 121 and 168 dc amperes corresponding to 30, 40, 50, 60, 75 and 100 hp drive motor ratings. The field rectifier output is 230 v with standard ratings of 1.0, 2.0, 3.0, or 4.5 dc amperes.

Electronic circuits control the output of the armature rectifier and provide the functions of speed control up to base speed, current limit and/or time limit acceleration, and compounding (IR drop compensation). The drive operates directly from a three-phase, 60 cycle, 440 v ac line. Autotransformers are used for line voltages other than 440 v.

Field weakening may be accomplished by either a manual series rheostat or by automatic time-rate field weakening for higher than base speed operation. A series rheostat, mounted in tandem with the armature voltage potentiometer, provides the manual adjustment. Automatic field weakening is available with either time-rate or current limit acceleration, or both. That is, upon starting, the field is at full strength and the motor accelerates to base speed. Then, the field will automatically begin to weaken to the desired speed. The speed may either be preset or changed while operating.

The operator's control station, for basic control, contains a speed adjusting potentiometer, and start-stop pushbuttons. It offers complete remote control for the drive.

Fig. 3 illustrates the functions performed by the drive. The input voltage supplies the Phase Shifting Bridge, the Motor Field Exciter, and the power supplies for the tube circuits. The armature voltage and armature current signals provide the feedback information for close-loop operation—with the speed adjuster voltage as reference.

The main power rectifier consists of six mercury pool rectifier tubes connected in a three-phase, full-wave bridge circuit as shown in Fig. 4. Grid control is used to obtain adjustable voltage output. The phase angle at which the grids are fired determines the dc output voltage. The electronic control panel acts as the "brain" in controlling the grid.

Many signals are combined at the control tube and determine its current. This current, in turn, saturates an inductance in a phase-shifting bridge circuit. The phase-shifted signal is amplified and broken up to match the three-phase power input. It is put through a peaking network and is then capable of varying the output voltage from the power rectifier. To produce the six-pulses-per-cycle output voltage in the power circuit, two tubes must carry current simultaneously in the following order: tubes 1-5, 5-3, 3-6, 6-2, 2-4 and 4-1. The sequence of firing is dependent on the proper line phase rotation.

All grid peaks are phased backward and forward simultaneously with the Phase Shift Bridge, as shown in the Block Diagram. The control tube controls this function so that all feedback, current limit, IR drop compensation, and speed controls signals are fed into the grid circuit of the control tube in order to properly phase the main rectifier grid peaks for the desired voltage output to the drive motor armature. The drive is inherently very quick in response—eliminating many problems of instability.

Maintenance of recording instruments

LEO WALTER

THE WIDER USE of recording instruments in a mill adds more elaborate instrument parts to the indicating instrument mechanism. Preventive maintenance of recording thermometers, rate of flow meters, combustion analyzers, etc., has thus to deal with these recording sections in addition to the basic mechanisms. There is no need, however, to be shy to open a recording instrument. All modern recorders have been designed for easy accessibility of the recording mechanism, consisting of mechanical or synchrome motor clockwork for chart drive, pen mechanism and the like.

Instrument charts

In the case of indicating instruments, the position of a pointer on an instrument scale indicates the measurement made. The addition of an integrator is often found in rate of flow meters, etc. The pointer in a recording instrument can be supplied with a pen or stylus arranged to record measured values on a moving chart. The latter may be a drum chart that is continuously unwound from a roll (Fig. 1).

An important point is to choose the speed of the chart correctly in order to achieve well-spaced record curves. Modern recorders usually allow easy change of gear wheels for adapting the chart speeds to existing working conditions and pen movement. During the last years, multi-pen recorders have come into wider use whereby two or more pen arms write on a single circular—or roll—chart, usually in different colored inks. Several measuring elements are encased in an instrument

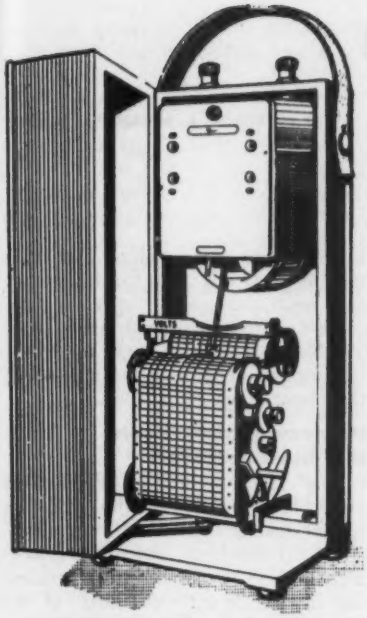


Fig. 1—Portable voltage recorder ready for a change of chart, filling of pen and cleaning of gear

housing and produce simultaneously co-ordinated records on the same chart. For example, temperatures of feed-water inlet to economizer and feed-water outlet to boiler, plus respective flue gas temperatures from boiler and from economizer to chimney can be recorded by a four-pen instrument on a roll chart. Other multi-purpose recorders show steam pressure, superheat temperature and rate of flow on a single circular chart.

There is no doubt that the use of recorders in instrumentation is preferable, because an indicator gives only a measured value at a certain moment, whereas a chart record is an unfailing document which can be filed, and which reveals the change of a measured factor over a longer period of time. If it were only a question of indicators versus recorders, irrespective of first installation cost and of maintenance, the choice would invariably fall on recording instruments. In practice, however, the amount of money set aside for instrumentation is usually very limited when considering the total installation and running costs of a plant. In addition to financial considerations, comes the question of availability of the right type of plant personnel for keeping recorders in good working order. Obviously, the number of recording instruments will be greater in the large plant; smaller plants will have mainly indicating instruments.

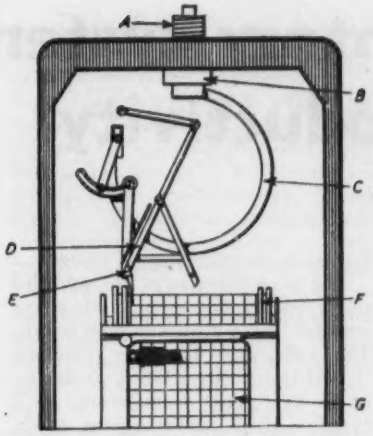


Fig. 2—Bourdon type element fitted in recorder housing

Servicing Instruments

Servicing recording instruments is similar to servicing indicators. Modern recorders have the linkwork from measuring element to the recording pen accessible. In some types, at a touch of a spring-loaded catch, the platen on which is mounted the clockwork mechanism with the paper roll and pen arm hinges forward clear of the instrument case. This makes inspection and chart changes easy. All modern instruments, whether using circular or rectangular charts, have been designed for accessibility of all working parts, including the pen arm and pen. Fig. 2 shows diagrammatically the pressure mechanism of a pressure or temperature recorder. "A" is the impulse connection (pressure tapping, tubing or capillary), "B" is the socket for fixing one end of the Bourdon tube "C", the linkwork "D" moves the recorder pen "E" in accordance with deflection of the Bourdon element, and the clockwork drive "F" moves record chart "G" at the desired speed.

Each of the above parts requires preventive maintenance. It is of course essential to keep the mechanism clean, away from radiant heat or fumes. Maintenance of the linkwork requires freedom from friction, oiling of bearings and spindle ends, cleaning of pivots, etc. To keep the recorder pen correctly fixed, and to clean same frequently is an obvious precaution (Fig. 3). Small repairs on the mechanical clockwork mechanism or on an electrical synchrome motor drive for the chart might be performed by a very skilled watchmaker or electrician, but where a greater number of drives are standardized, replace units should be kept in store.

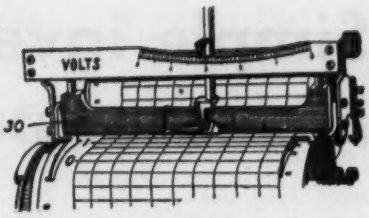


Fig. 3—Roll chart, pen reservoir and instrument pen

Preventive maintenance also includes storage of paper rolls, instrument pens, hair springs and sometimes Bourdon elements. To work out an efficient storage system for a multitude of precision parts is no minor job in a mill where dozens of instruments have to be maintained. Study of maintenance instructions from the makers, coupled with practical experience, will disclose which essential spare parts must be kept in stock.

Standardization

This brings up the question of standardization. For an appreciable time, interchangeability of instrument parts has been the target, and it is obvious that the use of a single instrument has advantages which facilitate repairs. The modern recorder-controller instrument is an example of what the modern instrument designer has in mind. Failure of an electronic tube is most easily repaired by taking out the faulty unit and replacing it by a calibrated spare unit. Standardization of record charts, of instrument pens and of chart drive mechanisms facilitates maintenance considerably.

Revision of maintenance instructions

The writer would like to conclude this brief survey with the earnest recommendation to instrument makers to revise and improve some of their maintenance instructions. Some of them are difficult to understand by less skilled users. Others are incomplete or not sufficiently illustrated. An isometric sketch in the right place is often worth more than any lengthy explanation in words. The practice that sales literature is presented in attractively printed form, but that fixing and maintenance instructions are relegated to duplicated sheets with often illegible sketches, etc., should be revised. After all, the main purpose of any industrial instrument is not to be advertised and sold by the maker, but to be used at top efficiency by the user. To enable this, clear, concise and well-printed maintenance instructions are required.

Simple inventory system increases productivity

GEORGE J. BEVANS*

THE PROBLEMS of assuring an accurate identification of raw materials upon receipt, their prompt availability from storage, their correct accounting and their right proportioning upon entrance into production are of varying magnitude in every pulp and paper mill.

Robert Gair Co. Inc., one of the world's largest manufacturers of paperboard and paper products, maintains a tight control by means of a three-stub tag system. Gair has 40 plants in the United States and Canada, employs 11,500 people and does a sales volume in excess of $160,000,000 a year. Their simple control system can be adopted with equal success by any other company using in its product different materials of similar appearance and therefore hard to identify and subject to undesirable interchange.

Each of Gair's eight mills manufacturing boxboard exclusively uses up to 30 different grades of scrap paper to make several different types of end product. Each type of end product is made from a different combination of those scrap paper grades, and only an expert can readily distinguish one grade from another. Yet wrong identification of various grades could be costly and wasteful both in time and identification materials.

How receipt of a shipment is handled

Different grades of scrap paper come to the plant in 400- to 1000-lb. bales, many of which look exactly alike. For each incoming shipment a scale man fills out a serially numbered receiving ticket in triplicate.

This ticket identifies the receiving plant, the shipment's vendor, the carrier, the freight car number or truck license number, the date of the freight bill, its number, and the amount.

The scale man inserts this triplicate receiving ticket in a time clock and stamps on it the date and hour of the shipment's arrival. When unloading starts, he stamps the receiving ticket with the date and hour, and again when unloading is completed.

This time record controls unloading costs and the number of men needed and protects the company against paying unjustified demurrage charges.

The scrap paper bales are unloaded singly onto a Towmotor truck whose operator drives it directly onto a scale. The scale man has been carefully trained to identify a bale's grade correctly by quick examination of a sample. After identifying the grade, he subtracts from the figure shown on the scale the known weight of the Towmotor truck and operator and marks the bale's net weight on the receiving ticket along with the grade identifiaction code symbol and the code symbol for the warehouse bay in which he wants the bale stored.

He has in pigeon-holes in a rack on his office wall a pile of specially imprinted system tags for each different grade of scrap paper his plant uses. He now takes a three-stub system tag imprinted with the code symbol for the grade of scrap paper in the bale he has just weighed. We'll assume this code symbol is 11-A-99 Overissue News.

On each of the tag's three stubs — A, B and C — the scale man notes the lot number (same as the serial number printed on the receiving ticket), the symbol number of the warehouse bay where the bale is to be stored (same as marked on the receiving ticket) and the weight (also as on the receiving ticket). By means of a small wire snap hook run through the hole at the top of the tag, the scale man attaches the tag to the bale. This hole through which the hook is run is sturdily reinforced with a cardboard patch, which prevents the tag from tearing loose under rough handling.

The scale man now tears stub C (the bottom stub) off the tag and clips it to his triplicate receiving ticket. The Towmotor truck operator delivers the bale to the warehouse bay designated on the B and A stubs left on the tag.

All bales in a shipment are similarly handled. The triplicate receiving ticket constitutes a complete record of all scrap paper bales in a shipment.

If the shipment came in by truck, the scale man has the driver sign all three copies of the completed receiving ticket and retain one to take back to the vendor. If the shipment came by rail, a copy of the receiving ticket is mailed to the vendor. The scale man retains one copy for his record and sends the original up to the accounting department with all C stubs attached, along with two copies of the invoice or bill of lading, unless they have come in by mail.

How raw material gets into book inventory

The plant accounting department checks the entries on the receiving ticket against the accompanying C stubs for assurance the ticket is correct. It next checks the ticket against the invoice or bill of lading. If the invoice or bill of lading check correctly with the receiving ticket, they are forwarded to the New York office for payment. If there is a disagreement, the vendor is notified.

The accounting department now transfers the data on the receiving ticket to inventory cards. These cards are filed according to grade and within a grade according to the bay where the bale is located. Under this system the accounting department can tell at a glance the state of the inventory and can keep the production department informed. This system also facilitates reconciliation of book and physical inventories. The receiving ticket is filed with invoice by name of vendor and date the shipment came in. The C stubs are separately filed according to serial number of the receiving ticket. They are kept for a month and then destroyed. The reason for keeping them is that if any question arises over billing, the data on the receiving tickets can be verified by reference to these C stubs.

How withdrawals of raw materials are handled

The warehouse foreman receives an order from the production department to deliver a specified weight of each of several grades of scrap paper to the beater room for processing. He knows to which bays each grade of material is assigned. But if a question arises as to the location of any bale, it can be settled quickly by reference to the copy of the receiving ticket in the scale man's file.

As the number of pounds in each bale is clearly marked on the A and B stubs still remaining on the bale's tag, it is easy to collect enough bales

*Management engineer, Systems Council

of each grade to fill the production department's order, which was stated in pounds.

When a bale of scrap paper is delivered into the beater room to go into production, the B stub on its tag is removed and sent to the accounting department where it is filed by grade and the date the bale was delivered to the beater room, and the bale is withdrawn from book inventory.

The A stub stays on the bale's tag until the bale is actually opened and its contents put into the beater. Thus, a bale is clearly identified as to grade until the very moment it enters processing. This prevents a wrong grade getting into a batch.

When the bale is opened, if its contents do not conform to the sample on which its assignment of grade was based by the scale man, the name of the vendor can be ascertained through the lot number on the A stub. This is the same as the serial number on the receiving ticket in the scale man's file, which identified the vendor.

When a reconciliation of book with physical inventory is attempted, each B stub on file with the accounting department must be matched by an A stub on a bale in the beater room which, though delivered for production, has not yet gone into processing. Such reconciliation is attempted at the end of each week.

Then all bales represented by B stubs in the accounting department which have been found in the beater room with their A stubs attached are restored to book inventory until their A stubs actually arrive.

Crossett

(Continued from page 217)

operating controls located at the tending side of the machine.

Machine hood and ventilation

A modern completely enclosed hood installation covers the dryers, including the area surrounding the machine in the basement. This installation is the first of its type for the middle south and the first in this country on a machine making food carton grades.

The basement enclosure has large sliding access panels at strategic points for broke removal. On the operating floor the enclosure on the rear side has telescoping panels permitting maximum accessibility for maintenance of machine components.

The front lifting panels can be automatically raised by electric motors when a break occurs in the dryer section or when it is necessary for operators to enter the enclosure.

In addition, the front panels are equipped with access doors to permit entrance by operating personnel without raising the entire lift curtain assembly. The totally-enclosed hood permits operation at increased enclosure temperature and consequently results in marked reduction of exhaust volumes from the dryer section and in increased drying efficiencies and higher moisture-carrying capacities of the exhaust vapors. The increased exhaust temperatures associated with a totally-enclosed hood make the use of Briner economizers extremely profitable even in southern climates. All supply air-delivered into the enclosure is heated in the Briner economizers.

Also due to the reduced exhaust volumes from the machine, the volume of fresh air required to obtain balanced machine room conditions is markedly reduced. Consequently, the number and size of supply and exhaust fans, as well as the total motor horse power requirements, are reduced.

Exhaust volumes from the enclosure are automatically controlled with dew point type controllers regulating the speed of the variable speed exhaust fans. This permits continuous and more constant control of conditions within the enclosure and consequently a stabilization of the variables affecting drying, which are inherent with changing weather conditions on an open-hooded machine.

In addition to the paper machine air systems, there is also a complete machine room roof heating and ventilating system and ventilating systems for all electrical controlled centers. There is a complete calender cooling system for each of the two calenders and a modern trim conveying system for the duplex cutter and rewinder. The trim conveying system is designed to pick up trim from either the cutter or rewinder and deliver it to the broke chest through a common duct system.

A suction system for the cutter, with a suction box located beneath the tapes, holds the cut sheets firmly in place on their travel towards the collection boxes.

All outside air entering the ventilating and drying system is filtered with automatic type air filters to provide clean air for all process and general ventilation requirements.

Calendering and finishing

The calender section is a twin open-side calender stack arrangement. The first calender stack has a 36-in. diameter king roll, a 24-in. diameter queen roll, four 16-in. diameter rolls and a 24-in. diameter top roll. The second calender stack has a 36-in. diameter king roll, a 24-in. diameter queen roll, six 16-in. diameter rolls and a 24-in. top roll.

The reel, a constant-speed board type, is equipped with double-action air cylinders at front and back to regulate nip pressures in both the starting and secondary positions.

Directly after the reel is a heavy-duty duplex cutter. This gives the operator a choice of either reeling up the sheet or cutting it directly from the calender. The duplex cutter is designed to cut sheets of two different lengths and nine different widths.

The heavy-duty board type unwind stand is equipped with air-operated brakes activated by a patented "tru-tension" control. The unwind stands are adjustable in the machine and the cross-machine direction.

The model "L" winder is equipped with motor-driven roll ejector, shear slitters and sectional rider roll. These features coupled with a shaft puller and roll-lowering table reduce manual effort to a minimum.

Vacuum system

The vacuum requirements of the drum roll, suction primary press, inverse press, Vickery felt conditioners and the felt roll, are met by a 16 by 32 by 14 by 21 compound unit vacuum pump and a 16 by 36 single-stage unit vacuum pump, with a total capacity of 11,800 cfm of air at 10 in. to 22 in. mercury vacuum. The pumps are direct connected to electric motors operating at approximately 700 rpm.

Electrical distribution system

The electrical distribution system features 15 kv switch gear which provides control for one incoming line and five outgoing feeders, four of which distribute power to the new mill and one of which provides an interconnection between the 13.8 kw bus for the new mill and the 13.8 kw bus in the existing mill.

The addition of the new mill, which required an integration into the existing distribution system of an additional 10,000 kw of power, entailed an extensive revision of the distribution system as follows:

(1) a 13,000-volt primary distribution system was established; (2) all new circuit breaker equipment procured was of the indoor metal clad drawout type to provide maximum service continuity, ease of maintenance, and reduce fire hazard; (3) a fully coordinated relaying system was established; (4) an extensive grounding system was established.

Fig. 1—Lockport's $1,000,000 felt plant at Starkville, Miss.

Machine felts

— at the new Mississippi

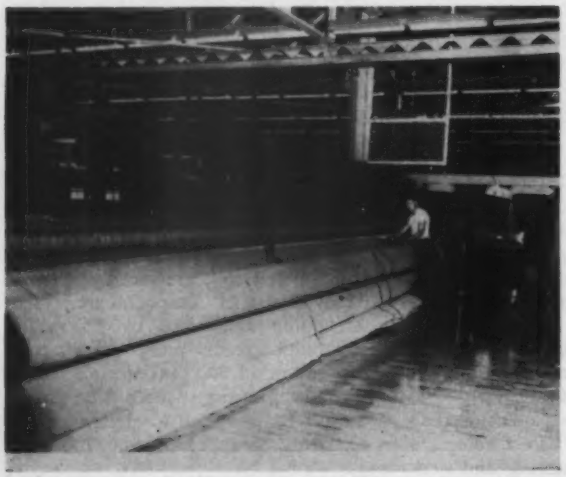


Fig. 2—The felt is woven on a loom; seen here is the 360-in. unit

Fig. 3—Felts, not woven endless, are joined by expert joiners

THE SOUTH'S FIRST plant for the manufacture of paper machine felts completed its initial shipment in December 1955. The $1,000,000 operation at Starkville, Miss., was built by Lockport Felt Co.

The felt manufacturing process here begins with the weaving of wool thread (spun from a variety of scoured wools at the firm's Newfane, N. Y. plant) and is carried through the burling, joining, fulling, napping and drying steps. The plant is constructed in modern design and is completely air conditioned.

In his dedicatory remarks Raymond J. Lee, president of Lockport Felt, declared, "In many ways it has been a heart-warming experience to pioneer in building and equipping the South's first felt mill. We have been warmly welcomed, both by the southern papermakers and by the people of the Starkville area. It has made the job easier and given us great encouragement for the future. We have already seen the fine results this new facility can produce for the paper industry and for ourselves in making possible closer contact and better service."

The process

Wool is procured nationally and is also imported from every corner of the globe to obtain the high quality of blends required for optimum felt performance. Every felt is tailor-made for the individual paper machine, and many different combinations of wool types and grades — in addition to a variety of synthetic fibers — are used in the felt-making process. Each combination of scoured wool is processed in the mixing picker at the Newfane plant. The blended wool then goes to the carding machines, where it is prepared for the spinning operation on worsted spinning frames.

The operation at the Starkville plant begins with the rewinding of the finished thread, where (1) filling yarns are transferred to smaller bobbins that fit the loom shuttles, and (2) warp yarns are wound on the large reel, followed

made in South

plant of Lockport Felt Co.

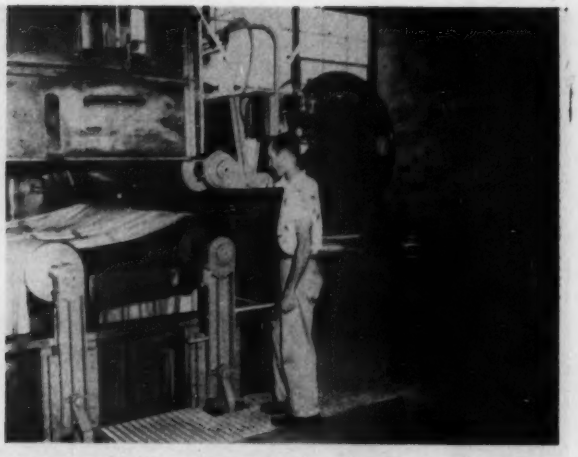


Fig. 4—On the left is the endless felt washer; on the right the centrifugal extractor

by rewinding on a loom beam in preparation to weaving on the 360-in. loom (Fig. 2), or on any of a number of other new looms installed in the weaving section. An additional 450-in. loom is on order and will be added to the equipment in the near future.

The woven felt then is carefully examined in the burling operation for absolute uniformity in weaving (any knots and broken yarns removed) and then skilfully joined by expert joiners (Fig. 3).

In the fulling process the felt is reduced to its predetermined dimensions by heat, moisture and pressure, the latter also causing the individual yarns to interlock and form a cushion-like surface. It is then washed in an endless felt washer and spin-dried in a centrifugal extractor (Fig. 4).

The felt is then subjected to the napping operation (Fig. 6), during which the felt's nap is raised by sharp, flexible spines of the teazel. And finally the felt is dried and stretched to size on a mammoth specially designed 320-in. dryer equipped with an electric hydromatic system of propulsion and electronic control.

After drying, the felt is "conditioned," i.e., allowed to come to equilibrium with an atmosphere under controlled temperature and humidity conditions. The felts can further be moth-proofed and treated against mildew attack prior to shipping.

Fig. 5—The nap of the felt is raised by passing through rolls fitted with teazels

Causes of felt degradation

The chief causes of felt degradation during papermaking are:

(1) Excessive alkali conditions; (2) high residual chlorine or sulfur dioxide contents in the bleached pulps; (3) microbiological infestation of mold, mildew or bacteria, and (4) the solvent effect of water itself.

Felts are continuously being improved to give better performance and wear under all papermaking conditions.

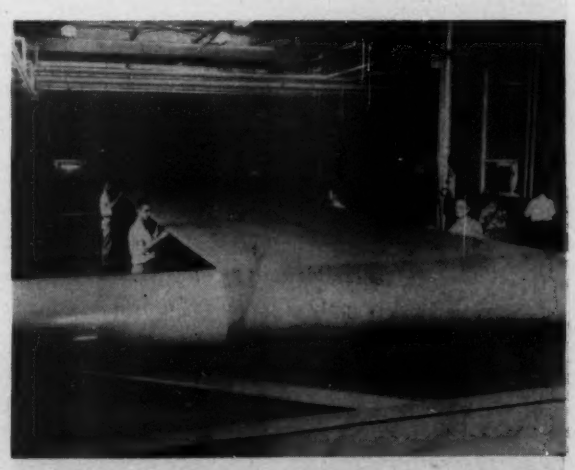
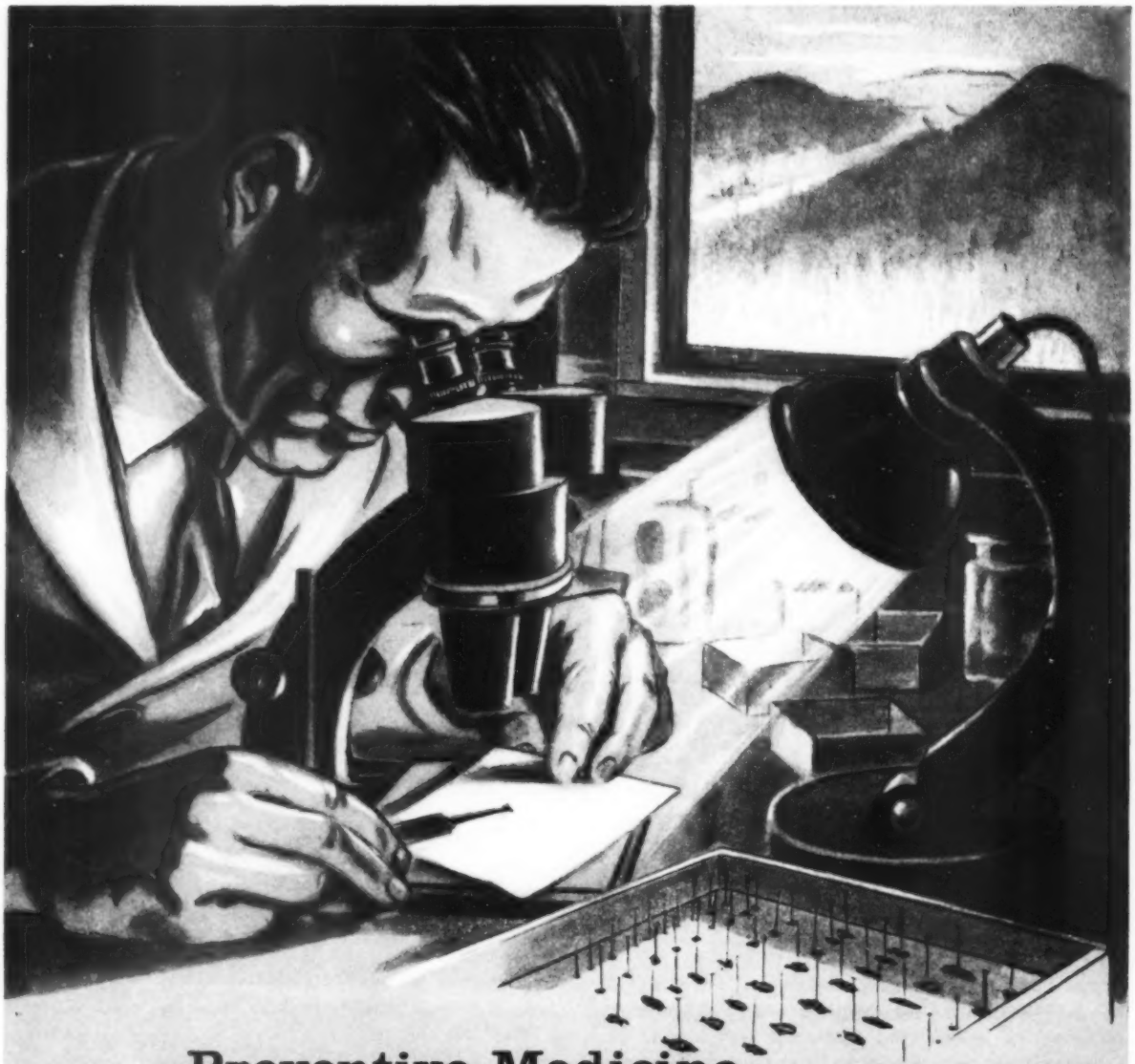


Fig. 6—The 320-in. dryer equipped with an electric hydromatic system and electronic control

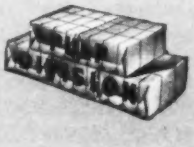


Preventive Medicine

Trees mature, rot, and die in an unmanaged forest. Insects and fire destroy millions of acres of forest annually at more than a billion dollar cost. Bringing death to trees and wildlife, insects and indifference are enemies with which to be dealt.

Weyerhaeuser Timber Company in 1941 initiated preventive medicine in the form of Tree Farms—privately owned lands dedicated to continuous growth of forest crops. On Tree Farms, vigorous protective measures are carried out against forest insects, diseases, and fire. Preventive medicine administered by enlightened management of timberlands insures a constant supply of pulpwood for generations yet to come.

WEYERHAEUSER



CURRENT COMMENTS

Businessmen in government . . . newsprint shortage: fact vs. fear

Manufacturers of newsprint and businessmen in government made the headlines during recent weeks, and oddly enough the two were interlocked in Washington news dispatches.

Two unfortunate phases of the situation have become evident. An attack on the businessmen in the paper field of government now is shown to have been due to a businessman's correct evaluation of the newsprint shortage situation. The attack on WOC (Without Compensation) businessmen who have been asked to give their experience to the government without government salary, is certainly making it steadily more difficult for the government to secure the assistance of men experienced in business. Although the latest attack on the WOC group was aimed at the paper section, the repercussion is already being felt in other branches of the Department of Commerce.

The supplanting of experienced businessmen by politicians and economic visionaries who never earned a dollar in business seems to be becoming more and more general. Government agencies have been called a haven for second grade citizens.

All of this comes back to the fact that current publishers' and politicians' complaints of a newsprint shortage are unjustified to the extent that by the end of 1957 there will be a surplus of newsprint-producing capacity, unless the demand pyramids to unexpected heights. New newsprint tonnage coming into the market may even be sufficient to meet any normal demand before the current year ends.

Shortage exaggerated

Some months ago, as published in THE PAPER INDUSTRY, the Department of Commerce—basing its statements on analyses by paper industry experts loaned to that Department—reported to a Congressional committee that newsprint production capacity in North America and demand were rapidly coming into a practical balance. The latest Congressional outburst named another experienced WOC man from the paper industry as making practically this same analysis in a report in 1953. As evidence of its charges against this WOC man the congressional committee quoted a letter he wrote to John R. Kimberly of Kimberly-Clark Corp. calling attention to this analysis. The grotesque distortion of the intent of this businessman-in-government is shown by the fact that the man in question was merely an acquaintance of Mr. Kimberly and in no way connected with him or his companies in a business way, and that Mr. Kimberly's principal industry interests are far from the newsprint field.

Even the statistics provided the American Newspaper Publishers Association at its April convention in New York confirm in part the estimates made in the report which was so sharply criticized in Congress.

The Democratic majority in the House anti-trust subcommittee made the following report on the shortage, which is being so sadly exaggerated:

"WOC's heading the division chose to ignore recommendations of the committee designed to enlarge our newsprint sources. For this regrettable neglect we are today reaping the consequences. A large part of the newsprint shortage may be directly attributed to this adamancy on the part of WOC's from the paper industry with respect to enlarging the newsprint expansion goal."

While this report was being publicized the trade papers have been filled with announcements of untold millions being allocated for immediate newsprint capacity expansion, and a mill with sufficient capacity to practically meet the reported 1956 shortage will be in production this fall.

As a step toward excluding first class citizens from governmental temporary posts the Democrats on the committee recommended that WOC's be barred by law from policy-making positions and that standards for their outside activities be adopted.

As examples of the manner in which the paper industry is meeting the evident need for more newsprint the following can be mentioned as only some of the newsprint projects under way or contemplated: International will have its new $57,000,000 mill in the South in operation this fall, at least in the newsprint field; Minnesota & Ontario is making a million-dollar expansion of one of its Canadian machines to give 20 per cent added capacity; the newly-formed Pulpwood Development Co., headed by W. O. Suggs, a southern lumberman, will build a $55,000,000 mill at Fulton, Tenn.; Bowater is contemplating another mill, this to be located in South Carolina; several millions have been allocated for a newsprint mill to convert insect-killed wood in the Rockies.

25% capacity increase

Even the American Newspaper Publishers Association analysis indicates a 25 per cent expansion in North American capacity over the next two and a half years. This situation is reviewed to compare political fulminations at Washington with industrial facts. Instead of future shortages, it is possible that expansion plans in the newsprint field may be over-optimistic.

Paper production in the early months of 1956 is, so far, heavier than the most optimistic earlier estimates. Mills are running seven days a week, instead of the six 24-hour days on which operating capacity is computed. Income reports for the first quarter show startling gains over the profit reports of even the banner year of 1955. There is no sign at the moment of any cloud in the paper industry's financial sky. If there is such a cloud it is not evident in the 11 per cent increase in tonnage produced in the first quarter of 1956 as compared with 1955.

Financial Reports

Paper industry securities reached record high points in the late weeks of April and the early part of May, and on May 10 the figures were still at heights never before attained, even though there had been a set-back in the long continued rise in securities

TWO GREAT NAMES

Teamed For Quality...Service...Progress

Two steelmakers, each known for its achievements in its own particular field of producing forged and annular rolled products are now combined to supply requirements of the largest and smallest. Two groups of production and research engineers are joined to better serve American industry. The new company is a totally owned subsidiary of Heppenstall and will operate independently. Each company will continue to offer American industry the custom made products for which it is famous.

MIDVALE - HEPPENSTALL CO.

NICETOWN
PHILADELPHIA 40, PA.

A SUBSIDIARY OF HEPPENSTALL COMPANY

values. The shift in paper mill securities was not due to industry conditions, but followed the trend in Wall Street as shown in other major industries.

Net Incomes

American Writing Paper Co.—Net income for 1955 was $697,702 as compared with $553,738 in 1954.

Celotex Corp.—Net income for the year ended Oct. 31 was $5,081,643 as compared with $3,202,649 for the preceding fiscal year.

Central Fibre Products Co.—Net income for 28 weeks ended Jan. 28 was $1,763,307 as compared with $1,877,963 for the like period a year ago.

Certain-Teed Corp.—Net 1955 income was $8,055,056 as against $5,315,721 in 1954.

Champion Paper & Fibre Co.—Net income for nine months ended Dec. 31, 1955 was $9,574,965 as compared with $7,068,936 for the comparable period of a year earlier.

Fraser Companies, Ltd.—Net earnings for the combined United States and Canadian operations totaled $5,710,785 as compared with a 1954 total of $4,868,171.

Robert Gair Co., Inc.—Net 1955 income was $9,320,000 as compared with $7,648,000 in 1954.

P. H. Glatfelter Co.—1955 income was $2,117,867 as compared with $1,639,022 in 1954.

Great Northern Paper Co.—Net 1955 earnings were $4,964,692 as compared with $4,137,621 a year ago.

Kimberly-Clark Corp.—Net income for 12 months ended Jan. 31, 1956 totaled $20,949,316 as compared with $19,376,435 for the previous fiscal year.

National Container Corp.—Net income for 1955 was $8,397,816 as compared with $3,527,769 in 1954.

St. Croix Paper Co.—Net 1956 income was $1,433,085 as against $1,361,636 in 1954.

Scott Paper Co.—Net income for 1955 was $21,336,139 as compared with $18,820,340 in 1954.

Sorg Paper Co.—Net 1955 income was $605,375 as compared with $413,732 in 1954.

United Board & Carton Co.—Net income for 36 weeks ended Feb. 4 was $460,381 as compared with $306,282 a year ago.

United States Envelope Co.—Net 1956 income was $1,588,662 as compared with $1,253,035 for the previous year.

S. D. Warren Co.—Net income in 1955 was $2,853,835 as compared with $1,700,072 in 1954.

Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	May 10, 1956	April 10, 1956
A.P.W.	5½	°5¾-6
Celotex	46¼	44
Same Pref.	19½	°19-19½
Certain-Teed	29⅞	29
Champion P & F	80½	74½
Same Pref.	103½	°105½-106¾
Chesapeake Corp.	37¾	39 (New)
Container Corp.	86½	79
Same Pref.	°100-104	°102-104
Crown Zellerbach	66	66
Same Pref.	°102¾-103½	°102½-103¼
Dixie Cup	58	53¾
Eastern Corp.	33⅞	33
Federal Paper Board	35⅝	34
Fibre Paperboard (Formerly Pabco)	40⅜	—
Same Pref.	127	—
Robert Gair	32	32½
Same Pref.	110¾	110
Great Northern	103	99
Hammermill	38⅜	40¾
International	134⅝	133
Same Pref.	102½	°102-104
Kimberly-Clark	53	54¾
MacAndrews & Forbes	44¾	44
Marathon	45⅞	43½
Masonite	46	46½
Mead Corp.	80	76½
Same Pref.	°100-101½	102½
Same Second Pref.	°88-92½	a-86
Minnesota & Ontario	40	37½
National Container	34⅛	27
Same Pref.	59	47
Oxford Paper	48	45
Same Pref.	°98¾-101½	°100-101
Rayonier Inc.	37¾	38½
Rhinelander	°51¾-53	46¼
Riegel	39	—
Scott Paper	72½	68¾
Same $3.40 Pref.	°93½-95	94
Same $4.00 Pref.	°102½-104	°103-105¾
St. Regis	52¼	47⅞
Same Pref.	°102½-103¼	—
Sutherland	46¾	45½
Union Bag & Paper	44⅛	41
United B. & C.	25¼	26½
United Wallpaper	2⅜	2⅜
Same Pref.	24	°21-22½
U. S. Gypsum	66½	69¼
Same Pref.	°172½-174½	176
West V. P. & P.	59¾	55½
Same Pref.	°105¼-106	105

New York Stock Exchange — Bonds

A.P.W. 5%	—	80½
Celotex 3¾%	—	—
Champion P & F Co. 3¼%	—	99
Mead Corp. 3%	—	—

American Stock Exchange — Stocks

American Writing	23	22⅛
Brown Company	22⅜	23⅞
Puget Sound	67⅛	71

°Closing Bid and Asked Prices.

Trained for the Special Problems of the Pulp and Paper Industry

Write, wire or phone for further information on any one or all of these services.

Maintenance "Control Center" Programs

. . . to reduce excess "downtime". To reduce "Costs" and to establish "Par" in maintenance performance.

Experienced Time Study "Standards"

. . . to establish degree of efficiency and to raise performance of Converting, Finishing, Shipping and all direct labor operations.

Wage Incentives

. . . with emphasis on quality, both hourly and supervisory, for Pulp, Papermaking, Finishing and Converting operations.

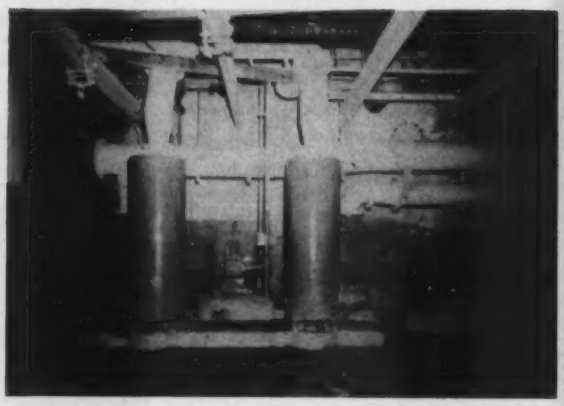
ASSOCIATED INDUSTRIAL CONSULTANTS

246 West State Street Trenton, N.J.
Telephone: EXport 3-2063

NEWS of the INDUSTRY

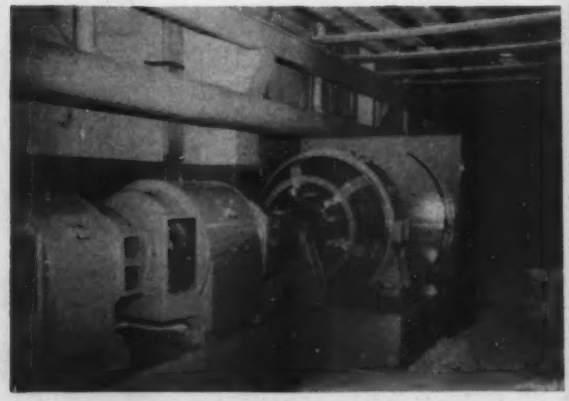
Ingenuity Reduces Shutdown Time at Powell River

Seven selectifiers (back view) to replace the existing Bird screens



Two vacuum pumps—with piping and power wiring—ready to run

New dryer drive motor and reduction gear set to go on the line



GE motor generator set installed and in readiness for test run

SO THAT SHUTDOWN time would be reduced to a minimum, engineers at Powell River Co. Ltd. spent many weeks in pre-installation work for the speed-up of No. 7 machine.

Much of the equipment involved in the project was in place long before the shutdown signal came late in March. The period of no production was therefore as short as engineering skill and human ingenuity could make it. The preliminary installation of new equipment was done with teamwork on the part of carpenters, electricians, millwrights, machinists, pipefitters, riggers, tinsmiths, welders and instrument mechanics. The team realized that it costs roughly $600 per hour to keep big No. 7 paper machine inactive.

Briefly, the giant conversion job consisted of installing selectifiers to replace Bird screens; a pressure-type head box with variable speed fan pump motors; a new and longer fourdrinier; a forward drive roll and new vacuum couch transfer with additional vacuum pumps; the relocation of first and second presses, and the installation of a General Electric drive in place of the old Harland drive.

More Mergers Predicted for the Paper Industry

The trend toward integration and the growth of national brands in paper products will bring about mergers in the pulp and paper industry, according to a study released recently by Blyth & Co. Inc., New York investment banking firm.

As reported by the *Milwaukee Journal,* Blyth sees other factors encouraging the merger movement as: (1) the desire to balance papermaking and converting capacities; (2) the trend toward geographical dispersion of plants, and (3) the need to expand research facilities. The survey also lists two advantages in

finance: (1) the more economical raising of capital for expansion and (2) the better marketability of stock in larger companies.

In a related finding, the survey declared:

"Sites for large new pulp mills in the South and Northwest—which combine the necessary ingredients of water, timber and transportation—are much sought after and increasingly hard to find. Thus, premium values are inherent in established mills capable of expansion."

Also touching on the industry's relative stability during a period of business depression, the report stated that, "if it may be assumed that in another year of depressed business like 1932 paper's operating rate would not go below 70 per cent, it could be expected that with current industry organization and leadership a majority of units would continue to operate without loss." (Last year's operating rate was 97 per cent.)

Bowaters Gets OK on S. Carolina Mill Site

The way has been cleared for the construction of a multimillion dollar pulp and paper mill near Rock Hill, S. C., by Bowaters Southern Paper Corp. A major obstacle was removed when the S. C. Water Pollution Control Authority gave the go-ahead to the Calhoun, Tenn. firm.

K. O. Elderkin, Bowaters general manager and vice president, had said that the site "has everything necessary for the satisfactory operation of the plant, except for the possibility of stream pollution of the Catawba River."

It is said that Bowaters, which had been seeking mill sites in the southern states, has initial plans for the operation of a 400-ton per day mill with about 1200 employees.

National Container to Double Jacksonville Output; Merger Discussed

National Container Corp. has launched a five-year expansion program aimed at doubling the capacity of its kraft paper mill in Jacksonville, Fla. Cost of the project will be about $25,000,000. The present output is approximately 450 daily tons.

A recent announcement from National Container headquarters in New York, N. Y., reveals that informal discussions have been carried on with Owens Illinois Glass Co. as to the possible integration of the two firms.

In addition, the pulp and paper manufacturer has reported that an agreement has been reached with Merritt-Chapman & Scott Corp. providing for consultation with M-C&S regarding new mill construction in the near future.

INSTALLED TO KEEP these paper mill rolls at an even temperature, an alcohol heater is checked by E. C. Yerkey of the B. F. Goodrich Traffic Department, Gordon McCracken of Manitoba Paper, and Harold Keelan, general agent for the Erie Railroad

Rubber-Covered Rolls Shipped to Canadian Mill in Heated Railroad Car

Sixteen rubber-covered mill rolls have been shipped from Akron, Ohio, to a Canadian mill in a specially heated box car. The experiment was a success.

Bound for Manitoba Paper Co. Ltd. at Pine Falls, Man., the rolls were produced by Beloit Iron Works in Beloit, Wis., and had been given their rubber covering at B. F. Goodrich Co. in Akron.

During the 1350-mile trip the temperature of the rolls was checked frequently by Gordon McCracken, an expediter employed by Manitoba Paper.

The paper company had feared that a sudden temperature change might cause the rolls to crack and had thus requested that they be shipped in a heated car. This posed a problem, since they were too long to make the turn in the 5-ft. door of a temperature-controlled refrigerator car. (The rolls were packed in wooden crates 22 ft. long and 2 ft. square. Each case weighed more than 1000 lb.)

Alcohol Heaters Used

At first, railroad men said that there was no provision for installing heaters and maintaining a constant temperature in a box car. Finally, however, the BFG Traffic Department, with the cooperation of the Erie Railroad, decided on the use of alcohol heating units.

Four thermostatically-controlled heaters were suspended from the roof of the car and tied to the sides to prevent swaying. The thermostats were set so that the units would come on full blast at 45°F. and cut off at 50°F.

The heaters stored enough alcohol to burn 500 hours on pilot and 50 hours at full blast. They were of 5-gal. capacity and were filled with one-third isopropanol alcohol and two-thirds menthanol alcohol.

At the start of the journey, McCracken declared that, "those heaters will have their work cut out for them. When I left Pine Falls the temperature was 28° below zero."

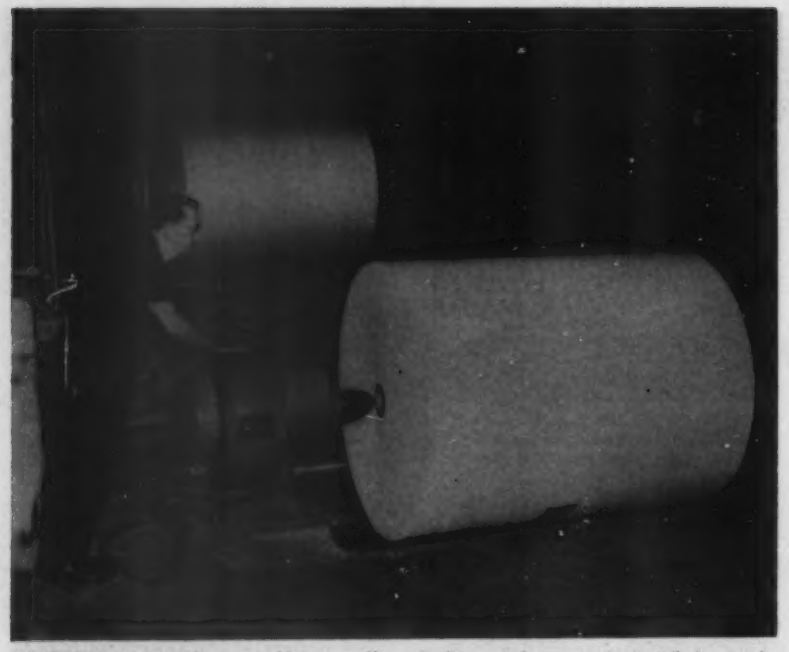
Expansion Underway at MacMillan & Bloedel

The $63,000,000 expansion program now underway at the Alberni Pulp & Paper Div. of MacMillan & Bloedel Ltd. is one of the biggest single pulp and paper mill building jobs ever undertaken in Canada. This according to the contractor, Dominion Construction Co. Ltd.

Twenty-two structures will be needed to complete the addition, requiring some 70,000 cu. yards of concrete. Early in May, about 40 per cent of the concrete had already been poured. The new buildings at the Port Alberni, B. C. mill will represent more than eight acres of floor space.

Dredging for the deep-sea wharf and log pond, completed earlier this year, required the removal of 400,000 cu. yards of earth.

When the new facilities go into operation, MacMillan & Bloedel will be entering two new fields—specialty paper products and newsprint. The



SHAFTLESS MILL roll stand (foreground) and slitter-winder recently installed at the Easton, Pa. plant of Dixie Cup Co. The Langston equipment is used to cut 50-in. diameter paper rolls into narrower rolls for processing into cups and lids. The unit unwinds, cuts and rewinds at about 500 fpm, and according to Dixie Cup is saving about $3000 per shift per year in labor costs

two newsprint machines will have a daily capacity of 600 tons, while the specialty unit will turn out 180 tons of coarse paper and board. At the same time, a 500-ton increase in the production of kraft pulp will be realized.

Scott Abandons Nova Scotia Mill Plans

Scott Paper Co. of Chester, Pa., has abandoned plans to construct a 300-ton bleached kraft pulp mill in eastern Nova Scotia. Scott engineers recently completed a six-month survey of the region with a view towards building the plant.

According to an official of the provincial government, the plan was dropped because of Scott's immediate necessity to expand facilities in areas adjacent to the most rapidly growing markets. The mill would have cost approximately $35,000,000.

Canadian International Completes $20,000,000 Project at LaTuque

The world's largest kraft linerboard paper machine has been put into operation at the LaTuque, Que. mill of Canadian International Paper Co. The unit, which along with auxiliary equipment cost $7,500,000, is capable of an eventual production of 1000 tons per day. It is housed in a new four-story building some 900 ft. in length.

The installation culminates a $20,000,000 expansion program at LaTuque which was undertaken in December 1954. Since that time, CIP has added 88,000 tons of annual output to boost the mill's capacity to some 263,000 tons.

Other major additions to the mill included a 300-ton recovery boiler, six digesters each with a 3400-cu. ft. capacity, a new high-pressure boiler rated at 250,000 lb. per hour and a new lime kiln in the chemical recovery plant.

Three additional barking drums, a wood stacker and a new conveyor system have been installed. Wood storage and handling facilities have been increased and cover 250,000 sq. ft. The fire protection system covering the woodyard was redesigned at a cost of $500,000.

The newly installed linerboard machine will consume 200,000 cords of pulpwood annually, bringing total mill consumption to 530,000 cords.

Whiting-Plover Expands

A $900,000 plant modernization and new building program for 1956-57 has been approved by the board of directors of Whiting-Plover Paper Co. of Stevens Point, Wis.

The project includes the conversion of the power plant to a high-pressure steam system, an addition of 32,000 sq. ft. providing for a new finishing department and the purchase of new machinery.

Thilmany P&P Expansion

Installation of a new paper machine at an estimated cost of $2,500,000 has been reported by Thilmany Pulp & Paper Co. of Kaukauna, Wis. Expenditure for auxiliary equipment will total another quarter of a million dollars.

The new machine — No. 12 — will be designed to operate at speeds of up to 1200 fpm and at a capacity of up to 100 tons per day depending on the grade of paper being produced. Incorporated in the unit will be a 15-ft. Yankee dryer, believed to be the largest in the United States.

Other expenditures recently approved include: the replacement of three digesters in the pulp mill, $100,000; expansion of the power plant, $1,000,000; converting department modernization, $250,000, and miscellaneous projects, including a new polyethylene machine, $750,000.

$95,000,000 for Expansion and Development at Marathon Corp.

A $95,000,000 financing program to provide funds for normal development and long-range expansion has been announced in Menasha, Wis., by Marathon Corp.

The money will be used to pay off the firm's existing $30,000,000 long-term insurance company loans, to restate a current $10,000,000 short-term bank debt and to provide $55,000,000 that will be available to meet financial requirements for a four-year expansion program that includes the construction of an integrated pulp and paper mill and converting plant at Naheola, Ala.

Firms involved in the financing agreements include Equitable Life Assurance Society of the United States, Northwestern Mutual Life Insurance Co., Bankers Trust Co. of New York, N. Y., and the First National City Bank of New York.

Marathon directors have given complete approval to the Naheola construction. Target date for completion of the initial phase of the project is late 1958, when the first

Now Available to the Paper Industry —the First Air-Powered Strapping Machine that Tensions, Seals and Cuts Steel Strapping

OUTSTANDING FEATURES

- Air power does the hard work—fast
- Tension is just right every time
- Field-tested dependability
- Light weight, portable

For ⅝" and ¾" Signode strapping; automatic seal-feed magazine holds 75 seals; tension adjustable to 1600 pounds.

SIGNODE STEEL STRAPPING CO.

2632 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-wide.
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

FIRST COMPLETELY INTEGRATED felt plant in the South is in operation at St. Stephen, S. C., where Albany Felt Co. completed the first felt for shipment on May 12. The $2,500,000 facility is of modern one-story design, completely air conditioned and without windows, light being provided by 1100 fluorescent lamps. With complete equipment installation, the plant will boast: (1) an improved picker and blending unit; (2) two 84-in. carding machines; (3) four large-ring spinning frames; (4) two automatic rewinders; (5) a large warp dresser with compressor; (6) new design spoolers; (7) seven looms varying in width from 250 to 600 in.; (8) two specially designed stainless steel rotary fulling mills; (9) a 108-in. basket extractor; (10) a special stainless steel washer; (11) a rotary teasel napping machine; (12) the world's largest felt dryer—360-in. face, and (13) a 360-in. singeing burner. At the right, Lewis R. Parker, president, and Wayne G. Davis, vice president for sales, inspect the first felt to be shipped

of three paper machines is scheduled to be placed in operation.

The firm has also announced that construction will begin this summer on its corporate headquarters building at Menasha. Completion is scheduled for next year.

The building will boast 120,000 sq. ft. of floor space and will house executive officers and staff offices for the marketing, industrial relations and controller's divisions.

Mando Modifies No. 7

A substantial increase in newsprint production will result from a $1,000,000 project recently begun by Minnesota & Ontario Paper Co. at Fort Frances, Ont. Involved is a modification of No. 7 paper machine aimed at greater operating speeds and improved efficiency.

(This is the second time within a year that the firm has announced an expansion in newsprint capacity. Last summer construction was started at Kenora on a $17,000,000 program to double production at that mill. The Fort Frances output will be increased by about 20 per cent.)

Highlight of the No. 7 project will be increased speed with a trim of 212 in. Major improvements will also be made to the wet end, the press section, drive and winder section.

At the wet end a Bird screen will be added and a Beloit air-padded enclosed headbox and slice installed. The number of table rolls will be increased and suction boxes repaced. Also to be added is a new forward drive roll.

The rebuilt press section will feature the incorporation of a vacuum pickup. According to J. F. MacKellar, vice president and general manager of Mando's Canadian Div., the latest innovations in the elimination of suction roll noise will be incorporated.

Increased power will be realized with the installation of a new Bepco motor-generator set. The machine drive is to be enlarged, while some existing motors will be relocated. Driving the wire will be the new forward drive roll and the couch roll.

Other improvements will include: an improved dryer syphon system; new dryer felt rolls of greater diameter; an expansion of the Ross Engineering heat recovery system to provide hot water for shower purposes; a new Beloit winder and drive; a second fan pump; three new vacuum pumps; a Vickery felt conditioner, and an increase in the capacity of the drive cooling equipment.

Charmin to Rehabilitate Paper Corp. Mill

Charmin Paper Mills Inc. of Green Bay, Wis., will begin rehabilitation work immediately on the plant it recently acquired at Cheboygan, Mich. The purchase was made at a bankruptcy sale from the trustees of Paper Corp. of America.

According to J. M. Conway, Charmin president, the plant will be put into operation as soon as possible, although rehabilitation will require several months.

Included in the work will be the renovation of the two paper machines, groundwood plant and pulp reclamation equipment.

Eventual production will include the company's regular line of Charmin and Evergreen paper products —toilet tissue, towels, napkins and facial tissue. Conway explained that if production of these items is not sufficient to absorb the capacity of the plant, or to meet the design of the equipment, "we will consider the manufacture of other kinds of paper that can be produced on the equipment."

Diamond Match Expansion

Production of molded pulp products at the Ogdensburg, N. Y. plant of Diamond Match Co. will be expanded in a program costing upwards of $1,500,000. The project will extend over 12 months.

Diamond Match plans to install a semi-commercial pilot plant at the idle sulfite mill in an effort to develop a method of utilizing local hardwoods in the molding operation.

In addition, the firm will install a new substation, transformers and switchgear at an estimated cost of $220,000.

At the same time, Diamond Match disclosed plans to develop foreign markets in the field of specialty packaging. According to Robert G. Fairburn, president, the firm has contracted to purchase for cash the 360,000 outstanding 1-pound sterling par ordinary shares of Hartmann Fibre Co. Ltd., major British producer of molded pulp products.

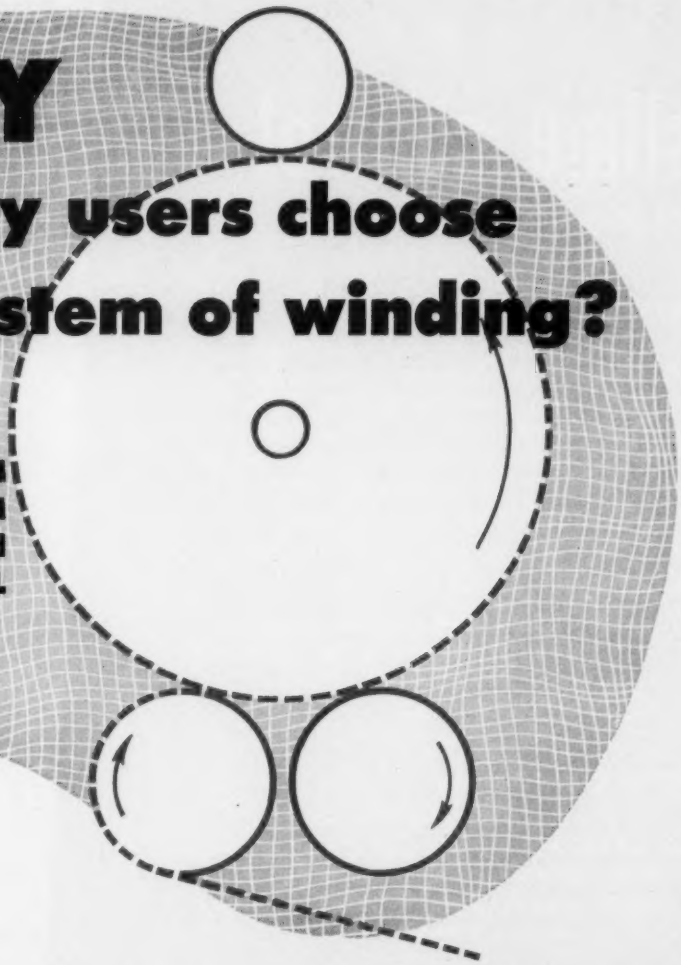
West Virginia Building S. C. Forest Nursery

West Virginia Pulp & Paper Co. is building a forest nursery in Dorchester County, S. C., capable of growing 20,000,000 seedlings annually. The nursery will rank in size with the largest in the South.

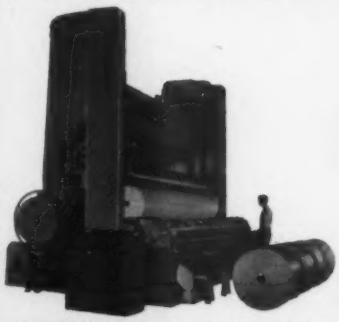
The firm, which owns and scien-

WHY do so many users choose this system of winding?

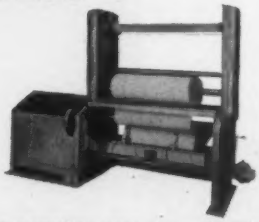
CAMERON'S TWO DRUM SURFACE WIND SYSTEM with automatically counterbalanced DRIVEN RIDING ROLL



Both of the machines below employ the Cameron winding system illustrated.



IMPERIAL high speed mill type winder. Speeds up to 7000 fpm*. Up to 72" rewind capacity. Built in widths to suit requirements.



CAMACHINE 400 versatile slitter-rewinder for finishing rooms and converting plants. Speeds up to 1000 fpm*. Maximum rewind capacity 30". Widths 32", 42", 52" and 62".

DIFFERENTIAL WINDING

For off-caliper webs such as some laminated or wax coated papers, a Cameron duplex winder using the differential winding system is recommended.

LOOK AHEAD . . .

AA-318

When your attention is absorbed by the more dramatic features of new Camachines it's easy to overlook, or to take for granted, something so simple as the Cameron winding system. Yet that is where good winding must start.

Unless you get off to a good start, you can't expect to get all of the requisites of good winding . . . wrinkle-free rolls, uniformly controlled density, smooth straight sides, elimination of snap-offs, high production speeds.

Ask why Camachines are chosen to serve the world's fastest papermaking machines on all types of paper, from the lightest weight to the heaviest board. And in finishing rooms and converting plants, too. A big part of the answer is right there in Cameron's two drum surface wind system with automatically counterbalanced driven riding roll.

To get off to a good start . . . and to stay ahead . . . ask for the winding system that has successfully served thousands of users through years of high-speed, low-cost dependable production. Call or write to Cameron today for complete technical information.

*Speed depends on characteristics of material, strip width and roll diameter.

and you'll wind up with CAMERON

CAMERON MACHINE COMPANY, 61 Poplar Street, Brooklyn 1, N. Y.

slime control

the scientific, economical way!

SLIMODYN

. . . a composition of colloidally dispersed silver-copper alloy and mercury as an organo-metallic—simply precludes bacteria, fungi and mold from becoming resistant simultaneously to the combination of these three heavy-metals. Relatively unaffected by changes of pH; will not shorten wire life or cause foaming.

MICRODYN

. . . a toxicant formulated for systems devoted to production of paper for the food packaging industry, and for those in which organo-mercurials are objectionable.

BOTH COMPOUNDS

. . . are completely dispersible in water, and are also suitable for spraying after washups. They adsorb readily on all surfaces, building a residual germicidal activity; need never be alternated with any other slimicides.

TECHNICAL SERVICE AT NO COST!

Each of our Technical Service Representatives is a chemist or bacteriologist by profession, and is thoroughly experienced in slime control. With full backing of our headquarters research team, he will analyze and solve your slime problem under actual mill conditions, working right in your own laboratory, or using the compact mobile laboratory carried in his car. And he'll work with you for as long as necessary—at no additional cost!

For complete information, contact

UNITED STATES

Movidyn

CORPORATION

863 N. Orleans Street
Chicago 10, Illinois
Telephone WHitehall 3-1530
Cable: MOVIDYN

tifically manages more than 750,000 acres of timberlands in the South, regards the new nursery as one of the most significant additions to its forest facilities in recent years.

The installation will be erected on 50 acres located 12 miles west of Summerville, headquarters of West Virginia's Southland Woodlands Div.

The nursery's facilities will include refrigeration rooms for holding seeds from one season to another; one large refrigerated area will be capable of holding 1,000,000 seedlings at an even temperature of 35°F.

Production Record Broken in First Quarter

Preliminary estimates for the first quarter of 1956 indicate that production of paper and board was 8,045,000 tons, the highest quarter on record. The announcement was made by E. W. Tinker, executive secretary of the American Paper & Pulp Association.

The more than 8,000,000-ton output was an increase of about 4.5 per cent over the last quarter of 1955, the previous high, and exceeded the total 1932 output of 7,998,000 tons.

There is a possibility, Tinker declared, that paper and board production for 1956 will be between 31,000,000 and 32,000,000 tons. Last year the industry operated at near-capacity levels to produce 29,900,000 tons, 12 per cent more than in 1954 when the previous record was established. (Since the end of World War II, the pulp and paper industry has spent about $3.5 billion for expansion and modernization.)

National Container Sells Ontonagon, Mich. Mill

Huss Ontonagon Pulp & Paper Co. has recently purchased the mill of National Container Corp. at Ontonagon,Mich., together with more than 30,000 acres in tree farms in Michigan's Upper Peninsula. (Huss Ontonagon Pulp & Paper is affiliated with Huss Lumber Co. of Chicago.)

For many years the last northern kraft linerboard mill producing container board for corrugated box plants, the Ontonagon facility will be immediately expanded at a cost of $3,000,000. Included will be the construction of additional capacity to utilize the neutral sulfite semichemical process of producing pulp and containerboard from the hardwoods available in the region.

As the softwoods became depleted, it became more and more apparent that hardwood pulping techniques proved at the U.S. Forest Products Laboratory in Madison, Wis., would have to be put to use. Practically at the doorstep of the plant was a residual stand of more than 24,000,000 cords of hardwood. Huss Ontonagon Pulp & Paper will take advantage of that tremendous reservoir.

Conversion Plans

The mill is an integrated kraft linerboard unit. It is thought that the Downingtown cylinder machine will not be altered, since it may at a later date be used for the production of semichemical foodboard. The kraft process digesters and the wet pulp machine will remain intact but not put to use at present.

Because the mill will resume operation on 100 per cent hardwoods (birch, maple, basswood, elm and beech), the steel-diked log pond will be filled in so that pulpwood will be delivered to the slashers at ground level.

All woodroom facilities will be adapted, and in the pulp mill continuous digesters of the Pandia or American Defibrator type will be installed.

The washing and recovery of semichemical liquors will follow the most modern techniques. Refiining equipment will be added to that already installed at the mill.

Pusey & Jones Machine

The new fourdrinier machine will be a 176-in. Pusey & Jones Corp. unit with an all-electronic sectional drive operating at speeds of up to 1500 fpm. It is to be housed in a new building.

The wood yard is to be expanded and new rail and ties laid so that diesel equipment will be able to operate to handle the mill's entire requirement either by rail or by truck. An inventory of at least 50,000 cords will be maintained at all times.

Certain-Teed Organizes New Operating Firm

Certain-Teed Products Corp. has organized a $20,000,000 company to operate C-T gypsum and paper properties in the United States and Canada.

The new firm, Bestwall Gypsum Co., will own eight Certain-Teed plants producing gypsum products, paperboard, boxboard and newsprint in Canada and the U. S. The expenditure of $32,000,000 is planned for the development of gypsum properties in Nova Scotia and the construction of three gypsum board plants and a paper mill in the U. S.

Recent Expansions in the Industry

Consolidated Paper Corp. Ltd.
has announced at Montreal that during 1956 it expects to increase its newsprint production by 75,000 tons over last year. In 1955 the company increased its productive capacity by 55,000 tons, but because of work stoppages nearly 40,000 tons were lost.

Powell River Co. Ltd.,
British Columbia newsprint producer, is considering the expansion of its operations to the southern United States in order to meet the increasing competition from that region.

Container Corp. of America
will be a principal stockholder in a pulp and paper mill to be established in Colombia, S. A. The plant, which will utilize Colombian forest woods and bagasse, has been planned by the nation's Instituto de Fomento Industrial to help alleviate the shortage of paper, especially newsprint. Ebasco Services Inc. of New York, N. Y., has made technical and economic surveys for the new mill.

The Institute of Paper Chemistry
at Appleton, Wis., will construct a $100,000 building with 37,000 sq. ft. of floor space to provide space and facilities for expanding educational and research programs.

Industrial Papelera Ecuatorian
will soon produce kraft paper and cardboard from grasses and the stalks of banana plants at a new mill in Latacunga, Equador, S. A.

Robert Gair Co. Inc.
of New York, N. Y., has contracted to buy the timberland properties of Mansfield Hardwood Lumber Co. of Shreveport, La. The acquisition involves 93,660 acres in Louisiana, of which 77,822 are held in fee and 15,838 are held under long-term

leases. (Last spring Gair acquired Southern Advance Bag & Paper Co. at Hodge, together with 230,000 timberland acres in Louisiana and Arkansas.)

Hudson Pulp & Paper Corp.
has broken ground at Carteret, N. J., for its first paper cup and container plant. The $2,000,000 unit is scheduled for completion next summer.

Upson Co.
has started construction of a research center in Lockport, N. Y. The structure, scheduled for completion in June, will cost approximately $100,000.

St. Regis Paper Co.
has acquired Pacific Waxed Paper Co. of Seattle. This purchase, plus acquisition of a similar operation in Salinas, Cal., gives St. Regis prominence in the West Coast converting industry.

Sorg Paper Co.
of Middletown, Ohio, has purchased equipment to produce and distribute the complete line of blotting paper that has been manufactured in Middletown for many years by Wrenn Paper Co. The Wrenn machines were moved to a recently completed converting plant on the Sorg property.

WHAT MAY WELL be the largest plant in the valve industry under one roof was opened recently at Houston, Texas by W-K-M Mfg. Co., a subsidiary of ACF Industries Inc. The multi-million dollar facility covers 12 acres and is completely air conditioned

---

Federal Paper Board Co. Inc.
of Bogota, N. J., is planning to acquire Morris Paper Mills of Morris, Ill., by an exchange of shares. The merger is subject to a favorable tax ruling and formal approval by directors and stockholders of both firms. Morris Paper operates a paperboard mill and carton plant at Morris and another carton plant (Lindley Box & Paper) at Marion, Ind., and will be operated as the Morris Div. of Federal. Federal operates 13 paperboard mills and carton plants along the eastern seaboard.

Allied News Briefs . . .

Backus Machine Works of Carlstadt, N. J., has appointed Cameron & Barkley Co. of Charleston, S. C., as exclusive distributor for the Backus cut-off saw in the southeastern states.

The Paper Makers' Chemical Department of **Hercules Powder Co.** has begun the production of wet-strength resins at its new West Coast unit in Portland, Ore.

F. C. Huyck & Sons of Rensselaer, N. Y., has announced that because of the great demand for felts it will not be able to close its plant for the usual summer vacation. Inspection and maintenance of machinery will take place during the July 4 week, but the office and shipping department will operate as usual.

Stein, Hall & Co. Inc. will construct a $250,000 manufacturing plant, office building and laboratory at Charlotte, N. C. The new facilities, which will be completed by the end of 1956, are designed to meet a growing demand for the firm's textile and adhesive products in the South and will replace the present Charlotte operation.

Hyster Co., manufacturer of industrial lift trucks and tractor equipment, will construct a new plant in Danville, Ill. On completion the new plant will be comprised of several units, and production will continue both there and at the present Danville plant.

Antara Chemicals, a sales division of **General Aniline & Film Corp.**, has appointed the Denver Fire Clay Co. as the distributor for its prod-

Greater Production of Higher Quality Pulp

• *in Less Time*
• *at Lower Cost*

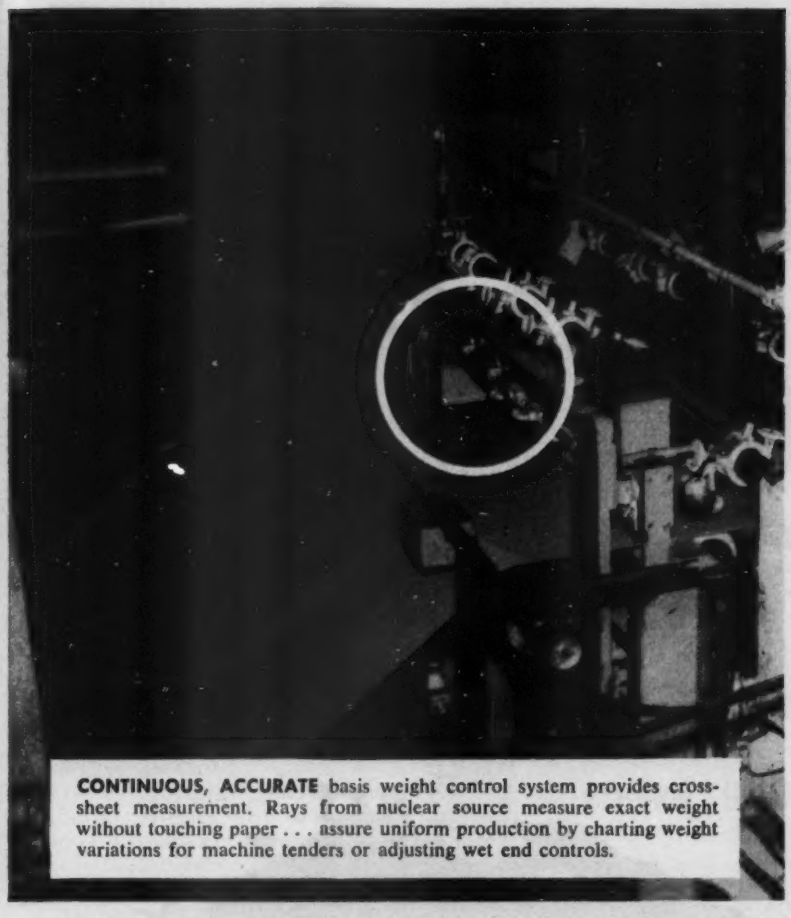
This is the end result of the various processes and equipment which we have installed in pulp mills throughout North America. Send us details of your requirements.

Chemipulp Process Inc.
Woolworth Bldg. Watertown, N.Y.

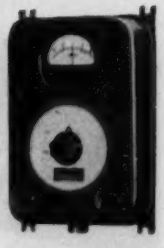
Associated with
Chemipulp Process Ltd., 403 Crescent Bldg., Montreal

West Coast
A. H. Lundberg
Orpheum Bldg., Seattle

Lundberg-Ahlen Equipment Ltd.
146 E. Broadway, Vancouver



CONTINUOUS, ACCURATE basis weight control system provides cross-sheet measurement. Rays from nuclear source measure exact weight without touching paper . . . assure uniform production by charting weight variations for machine tenders or adjusting wet end controls.

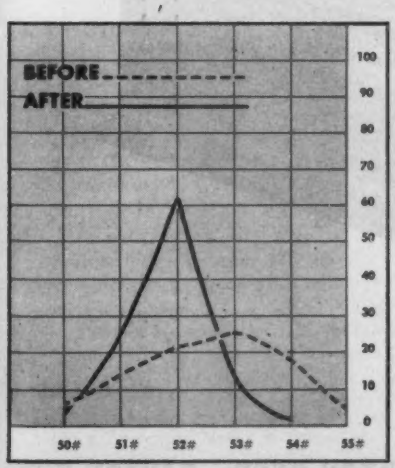


TARGET SELECTOR is adjusted to proper weight specification for each order. It then acts as constant guide for machine tender at the wet end.

STRIP CHART RECORDERS present wet and dry end weights continuously. Fast speed recorders give expanded profile readings. Console design has drawer construction for easier maintenance.

INCREASE QUALITY OF YOUR PAPER PRODUCTION

with Curtiss-Wright Control Systems



BEFORE, when hand-weighted tear sheets are used for control, weights vary greatly. **AFTER** installation of Curtiss-Wright System, uniformity sharply increases.

With Curtiss-Wright Basis Weight Control Systems installed on both wet and dry ends, it is possible to increase production on specification as much as 30% by reducing weight variations in both the machine and profile directions.

Also, wet and dry end measurement permits accurate settings on all moisture extraction equipment — assuring the sheet will enter the driers in the driest possible condition. Machine speed may be increased or steam requirements lowered.

For details of installations tailored to your needs, write Industrial Controls Dept., Curtiss-Wright Electronics Division, Carlstadt, N. J.

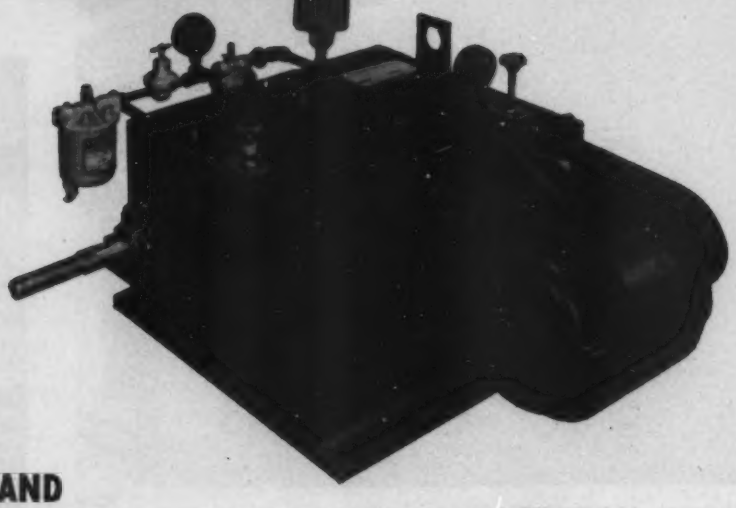
WEST COAST REPRESENTATIVE:
Western Dynamics Co., 444 Dexter Horton Bldg., Seattle 4, Wash.

CANADIAN REPRESENTATIVE:
Electronics Associates, Ltd., 4616 Yonge St., Willowdale, Ont.

Systems Frieseke & Hoepfner

ELECTRONICS DIVISION
CURTISS-WRIGHT
CORPORATION • CARLSTADT, N. J.

Defective Mill Rolls Cost Money



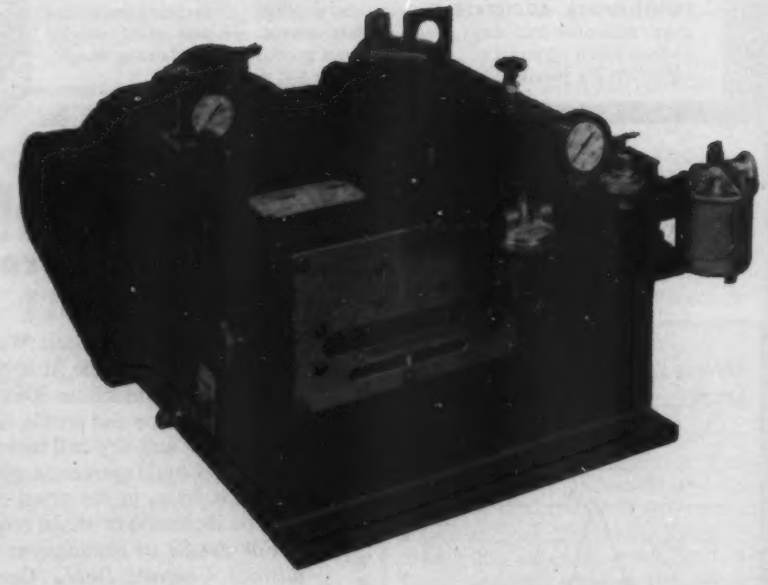
PREVENT WRINKLES AND HARD AND SOFT SPOTS

Paper making is an art and hence most sheets are far from perfect in texture or calibration. Rewinders, by nature of their operation, multiply and compound errors or defects.

The Ross Midwest Hydroscillator is designed to overcome unevenness of the sheet by an averaging process of oscillation.

Ross Midwest Hydroscillators operate hydraulically—deliver strokes from ½" to 3¾"—oscillate at speeds from 0 to 24" per minute—develop up to 11,000 lbs. thrust—are easy to install—require moderate amount of floor space.

Because Ross Midwest Hydroscillators are simple in design and ruggedly built, they will, with reasonable attention, deliver years of service.



RMF

THE ROSS MIDWEST FULTON CORP. • DAYTON, OHIO

A SUBSIDIARY OF J. O. ROSS ENGINEERING CORP.

ucts in Colorado, Wyoming, Montana, Utah, Idaho, New Mexico and Western Texas.

Patton Mfg. Co. Inc., Springfield, Ohio, has completed the construction of 7000 sq. ft. of office space to accommodate engineering and sales personnel to handle its expanding Paper Mill Machinery Div.

D. J. Murray Mfg. Co., Wausau, Wis., has announced its vacation plans: its foundries and pattern shop will be closed July 1-15, the machine shops, July 1-9. Emergency service will be available in the office, store room and shipping department.

An adhesives section has been added to the technical service department of **A. E. Staley Mfg. Co.**, Decatur, Ill. The laboratory is being set up to develop improved adhesives and to provide technical service to adhesive users. John Wrightsman, chemist in the company's paper section, will head the new section.

B-C Expansion

A $50,000,000 backlog coupled with a planned $3,000,000 capital equipment and re-tooling program were recently announced by the Black-Clawson Co.

Karl F. Landegger, chairman of the board, revealed that two-thirds of the re-equipment program had already been committed as a requisite towards placing the organization in the best competitive position in its history. The program will cover a two-year period and will affect the four domestic plants at Middletown and Hamilton, Ohio, and at Watertown and Fulton, N. Y.

Coming Events

Tappi

July 9-20—Fifth Statistical Conference (co-sponsored with CPPA Technical Section), Queens University, Kingston, Ont.

July 24—Kalamazoo Valley (joint meeting with Michigan Superintendents), Gull Lake Country Club, Kalamazoo

American Pulp & Paper Mill Superintendents Association

July 24—Michigan (joint meeting with Kalamazoo Valley Tappi), Gull Lake Country Club, Kalamazoo

Other meetings

June 13-16—CPPA Technical Section, summer meeting, Manor Richelieu, Murray Bay, Que.

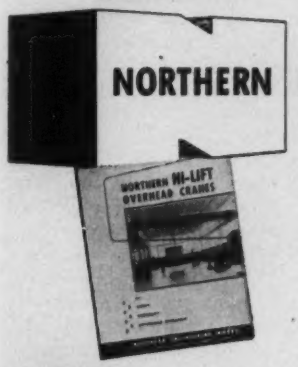
July 9-20—Fifth CPPA Statistical Conference (co-sponsored with Tappi), Queens University, Kingston, Ont.

July 10-12—Sixth Western Packaging & Materials Handling Exposition, Pan Pacific Auditorium, Los Angeles

NORTHERN SUPER CRANES • UP TO 150 TONS

Northern Super Cranes—since 1899—have been moving endless tonnages of material in thousands of plants in the United States and other countries. For safety, durability, precise manipulation, unsurpassed electrical equipment, minimum maintenance and maximum dependability in heavy duty service, many plant managers have installed Northern Cranes exclusively.

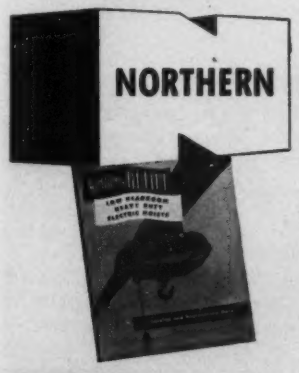
Write for Bulletins SE-108-A and G-700



NORTHERN HI-LIFT CRANES • UP TO 20 TONS

Northern Hi-Lift Cranes are intended both to supplement Northern Super Cranes in heavy duty service and to provide economical work handling in lighter service. They have the same engineering features as Northern Super Cranes —low design stress for safety—high grade steels, turned and ground shafts and press fits for durability—highest quality electrical equipment and controls for dependable operation.

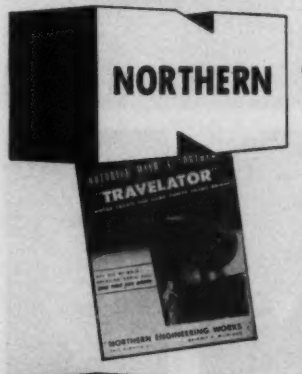
Write for Bulletin HL-115-R



NORTHERN HI-LIFT HOISTS • 2 TO 15 TONS

Northern Hi-Lift Hoists are heavy duty type electric hoists, designed especially for low headroom installations. They feature heavy duty roller bearings, extra heavy bearing shafts accurately press fitted with bearing races, extra large independent mechanical and electric brakes, and many other elements required in a good investment in hoist equipment.

Write for Bulletin H-112



NORTHERN TRAVELATORS • FOR LIGHT CRANES

The Northern Travelator is a bridge drive unit which can be applied to a hand traveled crane to convert it to power travel. It can be easily installed by your own mechanics and electricians in a few hours time. The roller chain drive facilitates installation and provides longer life and greater ability to absorb the usual impacts of crane service.

Write for Bulletin T-105

NORTHERN CRANES—HOISTS—TRAVELATORS

NORTHERN ENGINEERING WORKS
210 CHENE ST., DETROIT 7, MICH.

Vapo Systems

is the only practical method of conditioning paper during manufacturing operations, and in all converting processes.

Starches, Wax Emulsions, Plasticisers and other finish improvement solutions can be sprayed by VAPO SYSTEMS.

PAPER CONDITIONING THE MODERN WAY

Write for Information

Vapo Systems

132 W. Home Ave., Villa Park, Ill.

GRATON & KNIGHT

G&K

INDUSTRIAL LEATHERS

GRATON & KNIGHT Company

WORCESTER, MASSACHUSETTS

NAMES *in the* NEWS

Sanderson Retires at National Gypsum

Lewis R. Sanderson has retired as president of National Gypsum Co. He has been succeeded by Executive Vice President Fred A. Manské.

Melvin H. Baker, chairman of the board of directors who will continue as chief executive officer, also announced that Wells F. Anderson, operations vice president, has been elected a director to fill the Sanderson vacancy. Anderson was also elevated to the rank of senior vice president.

The creation of a new National Gypsum policy board composed of the president and the two senior vice presidents, Anderson and John W. Brown, vice president in charge of marketing, was also revealed.

St. Regis Names Three

St. Regis Paper Co. has announced personnel changes at its Central Technical Department in Deferiet, N. Y.

James B. Sisson has been named supervisor of research and development. He was previously extrusion engineer in the laboratory. Donald M. Ferguson has been appointed supervisor of technical service to the St. Regis Manufacturing Div. And R. A. Dando, previously analytical group leader, has been given the post of chemical engineer in charge of water treatment for all pulp and paper mills.

Aubrey Crabtree

H. Roy Crabtree

Fraser Election

The board of directors of Fraser Companies Ltd. and subsidiary firms (Fraser Paper Ltd. and Restigouche Co. Ltd.) have announced the election of Aubrey Crabtree, president and general manager, as board chairman to succeed the late Harold Crabtree. He continues as president and general manager.

The board also reported the election of H. Roy Crabtree of Montreal as a director (succeeding Harold Crabtree) and the election of R. A. Jodrey of Hantsport, N. S., as a director to succeed S. F. Duncan of Toronto, who has resigned.

Folke Becker, board chairman of Rhinelander Paper Co. of Rhinelander, Wis., has been elected a director of St. Regis Paper Co. His election follows the acquisition of the Wisconsin firm by St. Regis. Rhinelander will operate as a subsidiary under its present management.

Stuart E. Kay, with the firm since 1925, has been elected to the board of directors of International Paper Co. to fill the vacancy created by the death of William N. Hurlbut. Kay is vice president of the company.

Donald C. Porter has been named mill manager of Coosa River Newsprint Co. of Coosa Pines, Ala. He has been for eight years manager of Kimberly-Clark Corp.'s Canadian subsidiary, LongLac Pulp & Paper Co. Ltd. at Terrace Bay, Ont.

John H. Bork, for the past two years district logging superintendent in the Parmachenee area, has been promoted to assistant general logging superintendent of Brown Co. at Berlin, N. H.

Dernell Every has been appointed secretary-treasurer of the Waterproof Paper Manufacturers Association. He replaces Philip O. Deitsch, resigned.

Jeanette B. Whale has been elected president of Whale Safety Paper Co. of Waupaca, Wis., to succeed her late husband, R. Gerald Whale.

Albert Scharwachter of Arizona Chemical Co. has been reelected president of the Pulp Chemicals

Association; elected vice president was **Richard J. Spitz** of Newport Industries Inc. Scharwachter and **E. J. Calleton,** National Southern Products Corp., were elected chairman and vice-chairman respectively of the Tall Oil Div. **Lee A. Radeker** of Champion Paper & Fibre Co. and **E. M. Godat** of Crossett Chemical Co. were elected to similar posts in the Sulphate Turpentine Div.

Allied Personalities . . .

N. Carey Iler Jr. of the Pacific Coast Erection Div. of Chicago Bridge & Iron Co. has been transferred to the Cleveland sales office, and **Oliver E. Norris** of the Chicago Engineering department has been sent to the New York sales office.

James S. Thornton, for the past three years West Coast representative, has been named a sales engineer for Frank W. Egan & Co.

David W. Stapleton has been named president of Stowe-Woodward Inc. He has been executive vice president since 1954 and succeeds **E. W. Peterson,** who becomes chairman of the board of directors.

A. W. Plier has been reelected president and general manager of D. J. Murray Mfg. Co. of Wausau, Wis.

J. A. Holmes, the firm's first chief chemist, has been elected president of National Aluminate Corp. of Chicago. He succeeds **H. A. Kern,** one of the founders of the company, who continues as board chairman.

William L. Wendell, plant engineer for Fraser Paper Co. Ltd., has named field service engineer on felt problems for Draper Bros. Co.

Ira D. Wallach, executive vice president since 1952, has been elected president of Gottesman & Co. Inc. and Central National Corp. of New York, N. Y., to succeed the late D. Samuel Gottesman. Commercial operations will continue under the direction of Samuel Dauman, a director and first vice president of Gottesman & Co. and a vice president of Central National.

Dr. Charles A. Heiberger, for the past 10 years research director at the Ohio-Apex Div. of Food Machinery & Chemical Corp. at Nitro, W. Va., has been named manager of the Plastics and Polymers Dept. of the

Rated performance of every Nash Vacuum Pump is assured by this precise laboratory test

Rated capacities of Nash Vacuum Pumps are not theoretical. Every Nash Pump is tested individually. Air capacity is determined by delivery thru accurately machined and calibrated orifices. Related vacuum is measured by precise mercury column, and horse power is recorded electro-dynamically. Records of these tests are retained by us, and certified copies are available to Nash Pump owners.

That is one of the reasons why Nash Vacuum Pumps are installed in over a thousand leading Paper Mills. An engineer from Nash will be glad to survey your mill, and make recommendations, entirely without obligation to you.

NASH ENGINEERING COMPANY

440 WILSON ROAD, SO. NORWALK, CONN.

Batch pulping

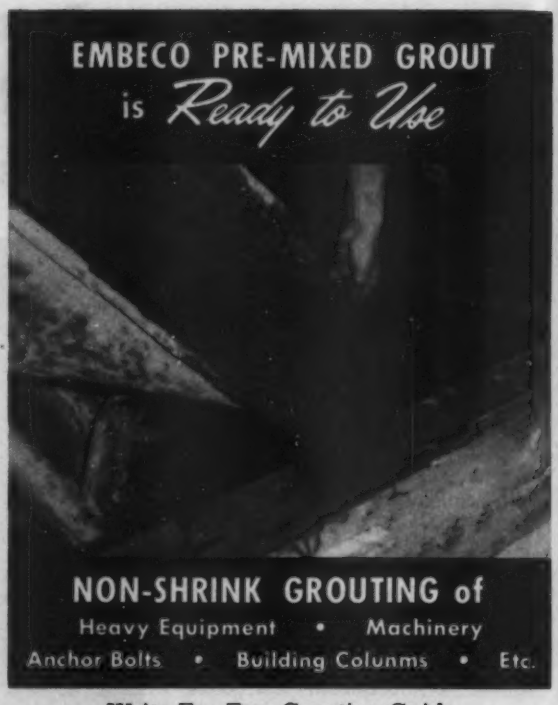
(Continued from page 192)

pulping as we see it, the unbeaten strength is down. Of course, that is just fundamental. But on beaten strength, provided you put the power into it, these high lignin pulps seem to ultimately come, at the same freeness, to rather the same mullen value, but it takes longer and more power to get there. I don't know whether I have answered your question.

Q. I was wondering if there was some point between the normal pulps and the very high lignin pulps in which there was a maximum strength built up.

A. (Mr. Limerick) I don't know. You are going to be limited, primarily, by the refining equipment in your mill and many things like that, which will put a practical limitation on strength. That is what will control operations in any particular case.

A. (Mr. Borlew) From my past experience in the process of high yield I would say, if the paper mill superintendent looks at the machine and finds that the chlorine number of the pulp is higher he will come back and say "Aha! That's why my mullen dropped". That is not necessarily so. We made an investigation, as I remember, and we found that, although the chlorine number was, say, 12, it did not have the same good mullen as when the chlorine number was 15. It's up to each individual mill to find out where its best operating ranges are. As I understand it Bathurst is cooking to a chlorine number of 17 (Mr. Limerick, "In the area of 16-17"), and Fernandina is cooking in the range of 13.5, while another mill is cooking to 41. Therefore, in this problem, as far as southern woods are concerned, there is a wide range of chlorine numbers in which pulps of marketable mullen are being made.


EMBECO PRE-MIXED GROUT
is Ready to Use
NON-SHRINK GROUTING of
Heavy Equipment • Machinery
Anchor Bolts • Building Columns • Etc.

Write For Free Grouting Guide

DIVISION OF AMERICAN-MARIETTA COMPANY

the MASTER BUILDERS co.

CLEVELAND 3, OHIO TORONTO 9, ONTARIO

Improve COLOR REGISTRATION...IMPRESSION...CONTROL

with this HUDSON-SHARP No. 2-RA

Rotogravure Press

Designed for unusually accurate printing register of one to five colors at very high speeds on glassine, cellophane, film, laminated foils and a wide range of papers. Prints web widths of 20" minimum and 50" maximum with print repeats from 15" to 36". Each color unit is complete in itself and all units are mounted on a common base plate and connected by a single drive shaft. Simplicity of design makes the machine one of the simplest to operate — easiest to readily make quick change-overs and clean-ups. Passageway is provided between each color unit for similarly easy access to printing roll and doctor blades. The 2-RA features special re-circulating hot air drying units which adequately accommodate the machine's high speed operation. Rotary sheeter or folder can be added. Write for complete description — learn what this press can do for you in increased production and profits.

- Running register controls
- Accurate impression pressure means
- Fully adjustable doctor blades
- Accurate adjustable rewind
- Fast, easy print roll removal
- Splash-proof, detachable ink pans
- Print papers, films and foils

HUDSON-SHARP

MACHINE CO · GREEN BAY · WIS

Manufacturers of

Printers, Embossers, Folders, Interfolders, Waxers, Laminators, Wrapping Machines, Core Winders, Packaging Presses, Creepers, and Napkins, Toilet Tissue and Paper Towel Units

NEW YORK • 55 WEST 42ND STREET

Write for new brochure showing our complete line of machines for processing paper, film and foil products. No obligation, of course!

FMC Chemicals Central Research Laboratory now under construction at Princeton, N. J. He is succeeded at Ohio-Apex by **Paul E. Williard**, his former assistant.

J. B. Morningstar, a great grandson of the founder, has been elected a vice president of Morningstar, Nicol Inc. He began his career in 1939 with the adhesive-producing subsidiary, Paisley Products Inc.

Walter J. Wood has been named to represent Appeton Woolen Mills in the Middle Atlantic States. He was formerly associated with the National Aniline Div. of Allied Chemical & Dye Corp.

Lawrence J. Valmore has been appointed a technical service representative for Lockport Felt Co. of Newfane, N. Y., and Starkville, Miss. He will headquarter in Newfane.

Robert D. Carpenter has been transferred from Camden, N. J., to the Chicago office of Samuel M. Langston Co. He will serve as a sales engineer.

Nils Wikner has returned to the Magnuson Products Corp. sales staff following service in the armed forces. He has been assignd to western New York and northwestern Pennsylvania.

Ralph M. Buechler, former sales engineer who has been with the firm since 1951, has been named sales manager of the Pulp and Paper Mill Machinery Div. of D. J. Murray Mfg. Co.

Necrology . . .

Alexander W. Cameron, manager for Canadian Wirebound Boxes Ltd. in Montreal, died suddenly April 23. A native of Scotland, Cameron joined the Canadian Wirebound Boxes staff as assistant plant manager in 1924. He was appointed manager in 1931. (The Montreal firm was purchased by Bathurst Power & Paper Co. Ltd. in 1954.)

Linwood W. Elliott, 75, senior field engineer for the Lobdell United Div. of United Engineering & Foundry Co. of Wilmington, Del., died suddenly April 12 while on a business trip in Beaumont, Texas. A veteran of nearly 60 years in the field, he was one of the leading experts on roll grinding and the handling of chilled iron rolls.

Frank C. VanAmberg, 57, owner and president of Angelus Paper & Excelsior Products Co. of Los Angeles, died in April.

Bernard F. Devine, 62, a vice president of Chain Belt Co., died recently in Milwaukee after a long illness. He joined the firm 48 years ago as an office boy, becoming sales manager and general manager before being named a vice president in 1948.

Charles H. Hahn, 59, sales engineer for D. J. Murray Mfg. Co., died recently in Rochester, Minn. He had been on the Murray staff since 1916 and had served as purchasing agent before becoming sales engineer.

John Stevens, 88, father of John Stevens Jr., president of Marathon Corp., died early in May. The senior Stevens was the son of the inventor of the roller mill process for paper mills.

Ernest Smith, former vice president and factory manager for Appleford Paper Products Ltd. in Hamilton, Ont., died early in April at the age of 60. He retired from the firm in 1951 because of poor health.

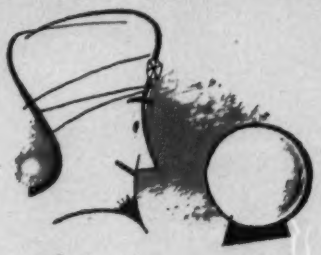
Crane Co. Executives Killed in Plane Crash

A southern Indiana plane crash in mid-May took the lives of six executives of Crane Co., Chicago manufacturer of valves and fittings. Two company pilots were also killed in the accident.

The aircraft was en route to Louisville, Ky., where the men were to attend a convention of the Heating, Piping & Air Conditioning Contractors Association. The crash took place at Jeffersonville, Ind.

Those killed were: James A. Dwyer, 59, vice president for industrial sales; George L. Erwin Jr., 60, vice president for heating sales; George J. Lindholm, 54, manager of valve and fitting sales; Jess A. McMurry, 59, director of branches; Charles E. Towner, 42, assistant to Mr. Erwin; Fred J. Wilkey, 47, special representative in the industrial sales department; Randy Mulherin, 54, pilot, and Robert Robinette, 27, co-pilot.

Why gamble with SAFETY by selecting fittings like this?



or this?

or this?

when you can be SAFETY sure with Swagelok® FITTINGS

GET ALL THE FACTS: Write for the Swagelok catalog. Address Dept. P4

CRAWFORD FITTING CO.
884 EAST 140th STREET
CLEVELAND 10, OHIO

One unit of several installations of R-C 2-stage Vacuum Pumps in a mid-western mill. Capacity 6150 cfm.

6 IMPORTANT FACTORS MAKE UP R-C *plur-ability*

When you select vacuum pumps for expansion or replacement, check these essentials which are available only in Roots-Connersville equipment.

- **Reduced horsepower at higher speeds** (514 rpm and up) creates power savings up to 25% and far lower first cost of motors.
- **Single-stage or two-stage units** in size ranges for all requirements.
- **Long-time reliability and low maintenance** no internal contacts or excessive wear. Almost complete freedom from down-time and maintenance.
- **Small floor space** less expensive foundations. Lower cost per cubic foot capacity. Adaptable to crowded space.
- **Minimum sealing water** from 4 gpm. to 40 gpm. Efficiencies not affected by changes in water temperature.

To see how these *plur-ability* factors result in low-cost, reliable performance of R-C Vacuum Pumps, write for details in Bulletin 50-B-13.

ROOTS-CONNERSVILLE BLOWER
A DIVISION OF DRESSER INDUSTRIES, INC.
1255 Walker Ave., Connersville, Indiana
In Canada—629 Adelaide St. W, Toronto, Ont.

PATENT REVIEWS

MELVIN NORD*

Deresination of wood pulp

U.S. 2,716,058, issued Aug. 23, 1955, to William H. Rapson and Morris Wayman and assigned to Canadian International Paper Co., relates to the manufacture of wood cellulose of very low resin content.

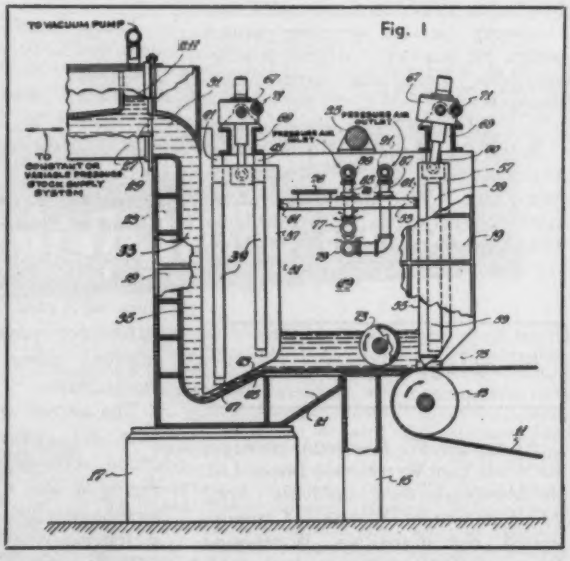
The resins are removed by extraction with a condensation product of ethylene oxide and octyl or monyl phenol (or certain other compounds named in the patent).

Paper calender

U.S. 2,718,827, issued Sept. 27, 1955, to Warren C. Whittum and assigned to Farrel-Birmingham Co. Inc., describes a mechanism for supporting the outer surface of one of two or more rolls used in a calender to prevent deflection of the supported roll. This device eliminates the necessity for providing such rolls with a crown and provides for a uniform pressure between the rolls on the paper.

Improving sheet formation of dissolving wood pulp

U.S. 2,719,464, issued Oct. 4, 1955, to Frank R. Charles and assigned to Canadian International Paper Co., describes improvements in forming sheets of dissolving pulp. The pulp sheet structure is modified so that improved steeping can be accomplished when the pulp is to undergo conversion into cellulose derivatives.



Papermaking headbox and inlet mechanisms

U.S. 2,736,246, issued Feb. 28, 1956, to Adam Jay Crittenden and Charles A. Lee, assigned to Kimberly-Clark Corp., provides a papermaking headbox and inlet mechanism in which the stock is maintained at a predetermined pressure level, in order to eliminate transient instabilities.

As shown in Figs. 1 and 2, stock reaches the interior of the ponding chamber 49 via the flow spreading conduit 33 and the passageway 47 at a predetermined pressure. The level at which the stock is maintained in the ponding chamber 49 is controlled by the position of the inflow end 111 of the stock and air discharge

*Patent attorney, 17600 Pinehurst, Detroit 21.

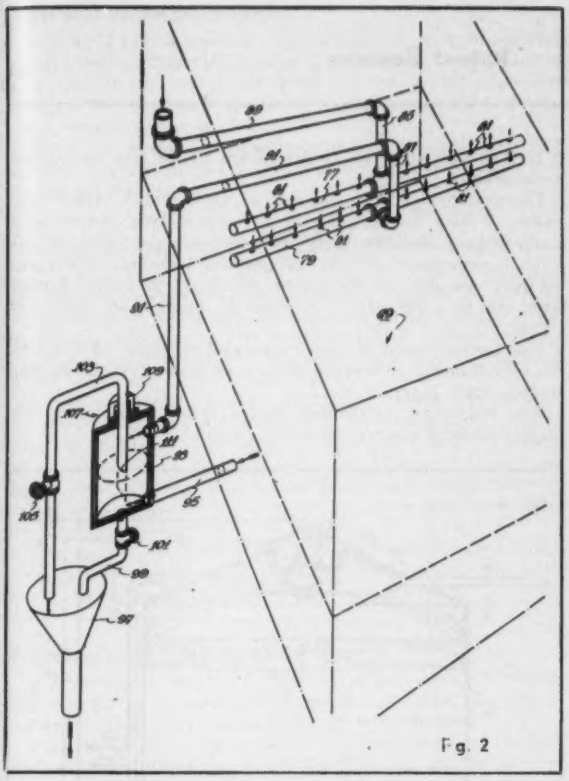


Fig. 2

line 103. By virtue of the adjustable support for that line provided by the gland connection 107, the stock level can be adjusted as desired. Air is supplied to the ponding chamber through pipe 89 and tube 77, and leaves through tube 79 and pipe 91. Exit air, along with stock leaving through pipe 95, enter the receiver 93. (Fig. 2), valve 101 normally being closed and valve 105 open. The air pressure is thus maintained constant by the flow of air into the ponding chamber at a rate sufficient to account for leaks and for some flow through tube 79.

Formation of sheets on fourdrinier wire

U.S. 2,727,442, issued Dec. 20, 1955, to Millard F. Hayes and assigned to Sandy Hill Iron & Brass Works, describes an improvement in the formation of sheet on the fourdrinier wire of a papermaking machine.

Flocculation of papermaking fibers is broken up by subjecting the papermaking stock on the wire to vibrations of high frequency and low amplitude. This provides complete suspension of individual fibers, thereby resulting in improved closeness of formation and generally improved characteristics of the paper.

The vibratory action is obtained by passing the stock-carrying fourdrinier wire at the wet end of the paper machine across a vessel containing water, and imparting vibrations to the water. The water level is equal to that of the stock on the wire, so that the fibers of stock on the wire are subjected to a vibratory action.

Treatment of waste sulfite liquor

U.S. 2,727,028, issued Dec. 13, 1955, to John K. Russell, David Craig, Gerald J. Byrd, and Richard L. Maeder, assigned to Lignosol Chemicals Ltd., provides a useful outlet for the supply of used sulfite liquor available in pulp mills.

Sulphur dioxide is first added to provide a weight ration of SO_2 to lime of 1.14. This SO_2 may be recovered by absorption from the relief gases obtained during the "blow back" period, or it may be added in the form of sulfite or bisulfite salts if alkalis giving soluble sulfites are used. Then the liquor

In AHCO's Technical Service Laboratories, the **"Men at Work"** sign is a fixture. Using the latest equipment, chemists and technicians are continually engaged in the development and improvement of auxiliary products for the paper trade. New products — and established ones — must conform to the rigid specifications set up by our laboratories and our customers.

Tried and proven AHCO Paper Auxiliaries

Eveners #1 and #32	Eveners for paper coating mixes.
Defoamer "D" series, Defoamers 69, 99, 477, and 511	For the successful control of foam and bubble formation during various stages in the manufacture of paper.
Synthratan ACA	For the prevention of the formation of pitch aggregates. Reduces viscosity of paper coating mixes.
AHCO Finish CS	For better printability, improved pigment binding. Readily dispersible, non-dusting, *exceptionally fine particle size.*

Our Technical Service Representatives and Laboratories are at your service. Call on us for your requirements — or to help solve your specific problems.

AHCO PRODUCTS

ARNOLD, HOFFMAN

ARNOLD, HOFFMAN & CO., INC. • EST. 1815
OFFICES & TECHNICAL SERVICE LABORATORIES
PROVIDENCE, ATLANTA, CHARLOTTE, TETERBORO
ASSOCIATED WITH IMPERIAL CHEMICAL INDUSTRIES, LIMITED • LONDON, ENGLAND

...Stop Leakage!.....

use SEAMLEX

THE SEAMLESS FLEXIBLE ALL-METAL HOSE

SEAMLEX Hose Ensures Uninterrupted Production

. . . because SEAMLEX is made of extra large, GENUINE SEAMLESS bronze tubing, helically corrugated by the exclusive SEAMLEX ROLL-IN PROCESS. Sturdily constructed throughout . . . Rugged reinforced end connections for added safety.

Largest range of stock sizes in bronze hose: 1/16" I.D. to 8" I.D. inclusive; most sizes also available in steel, stainless steel, monel and aluminum.

Write today for . . . FREE Bulletin #955 on SEAMLEX Quality Hose and Rotary Joints

SEAMLEX COMPANY INC

41-23 24th STREET, Dept. H
LONG ISLAND CITY 1, N. Y.

● *Since 1928, SEAMLEX Products are QUALITY Products.* ●

Easily-installed units for high-efficiency air movement in all duct systems. Direct-driven types for atmospheres within safe motor operating limits or belted models for hazardous fumes, vapors and excessive temperatures. Sizes 12" to 84" with 2, 4, 6, or 7 blades. Capacities to 120,000 C.F.M.

other models for every air-moving requirement

All Aerovent Fans are rated in accordance with the Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

Ask for free folder D-50!

Aerovent Fan Company, Inc.
Ash and Blane Streets Piqua, Ohio

Patent Reviews . . .

is treated with an alkali to precipitate all the lime as calcium monosulfite.

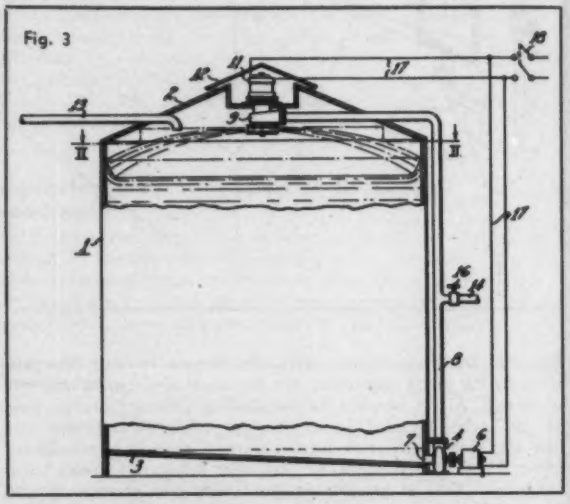
The precipitated lime consists of $CaSO_3.2H_2O$. After separation, it may be returned to the acid-making system as a slurry in the sulfur dioxide absorption towers.

After separation of the precipitated calcium sulfite and before evaporation of the liquor, the liquor is treated further with SO_2 to a pH of 1.5 in order to improve its color and clarity.

The treated liquor is then evaporated to about 55% solids. No objectionable deposition of scale or fouling of the heating surfaces takes place.

The product is particularly useful as a tanning agent for leather, or as an adhesive or bonding agent.

Fig. 3



Paper stock storage and handling

U.S. 2,723,196, issued Nov. 8, 1955, to Frank R. Forrest and assigned to Allis-Chalmers Mfg. Co., provides a method of storing and handling paper stock which maintains uniform fluidity and eliminates the formation of flow paths on withdrawal of stock from the stored path.

The invention contemplates a continual deposition of stock on and adjacent to the upper periphery of the tank, thereby creating a tendency for an ever-increasing head of stock to form and assuring a continual flow of stock down the side wall of the tank. Further assistance to this wall flow action is afforded by the centrifugal throwing of stock against the tank wall so that liquid is squeezed from the stock onto the tank wall, thereby lubricating the wall and materially lessening resistance to stock flow along it.

The apparatus is shown in Fig. 3. Stock passes through pump 4 and into a discharge pipe 8 leading up to the top of the tank and opening into a second centrifugal pump 9 which is mounted in the upper central portion of the tank 1. Pump 9 is driven by an electric motor 11, and is provided with an open impeller to serve as a rotary stock slinging element which throws paper stock radially. The top of tank 1 has a conical roof 12 which covers the electric motor 11 and prevents dirt and debris from collecting around it. A fresh supply of paper stock is intermittently introduced to the tank 1 by means of a feed pipe 13.

Pipe line 8 is provided with a bleed off pipe 14 which is equipped with a valve 16 for controlling the withdrawal of paper stock through pipe 14 as desired for use in succeeding paper making operations. Stock which is not drawn off through pipe 14 recirculates through the storage tank 1 as long as the operation of pump 4 is continued. The two electric motors 6 and 11 are connected by wires 17 to a common switch 18 which communicates with any appropriate external source of electric power.

High wet strength paper

U.S. 2,721,140, issued Oct. 18, 1955, to Cyrus A. Weisgerber and assigned to Hercules Powder Co., describes the production of a resin-treated felted cellulosic product having high wet strength. The process is applicable to the production of paper, board, shaped paper articles, etc.

The resin used is a polyvinylamine. The patent describes methods of producing the polyvinylamine compounds which may be used for this purpose.

Machine to fiberize a dry sheet of pulp paper

U.S. 2,722,386, issued Nov. 1, 1955, to Wilson P. Fraser and assigned to Protect-Al Co., describes a machine for breaking down newsprint sheets into fine dry particles or wool-like fibers which can be combined with a thermo-plastic resin to provide a molding composition. No liquids are used in the separating action.

A high-speed bladed rotor operating within a rough-walled cylinder breaks up and subdivides work fragments severed from the incoming sheet material. The blades have associated with them loosely hung rings which are free under impact and inertia forces to shift radially and axially and thereby dislodge and clear work pieces which might otherwise tend to accumulate and clog the action of the machine.

The air currents generated by the rotor rotation are used to carry the particles along through the apparatus and eventually to the discharge outlet.

Treating pulp with chlorine gas

U.S. 2,730,426, issued Jan. 10, 1956, to Frederick G. L. Becker and assigned to Cellulose Development Corp. Ltd., describes a process for continuous treatment of pulp with chlorine.

Two vertical countercurrent towers are used in series. The fibre concentration is 10-40 per cent in the first step, and 2-5 per cent in the second.

The pulp is added continuously at the top of the tower, and is diluted with water on the way down. Chlorine gas is admitted at an intermediate point and passes up through the tower. Thus, the only outlet for unreacted gas is through the high-concentration fibre.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Display Carton	Sutherland Paper Co.	2,730,232	1/10/56
Corrugated paper shipping container	Cozier Container Corp.	2,730,287	"
Paperboard container	Ex-Cell-O Corp.	2,730,289	"
Container and dispenser	John T. Lynes and Irving B. Levenson	2,730,290	"
Boxes or cartons	David Levkoff	2,730,293	"
Color Improvement of unsized porous paper	American Cyanamid Co.	2,730,446	"
Apparatus for treating pulp with liquid	Hercules Powder Co.	2,730,888	1/17/56
Mill for the continuous grinding of paper pulp	Werner Reisten	2,730,931	"
Machine for manufacturing bags	Leonard van der Meuden	2,730,934	"
Fully partitioned collapsible bottle carrier	Bergstein packaging Trust	2,731,170	"
Paperboard container	Ex-Cell-O Corp.	2,731,188	"
Refrigerator carton	Marathon Corp.	2,731,190	"
Fibreboard shipping container	Anderson Box Co.	2,731,191	"
Production of alpha cellulose from bagasse	I-Tsai Jen	2,731,345	"
Display Box	Container Corp. of America	2,732,062	1/24/56
Paperboard bottle carrier	Morris Paper Mills	2,732,097	"
Machine for filling and capping paper cartons	Sutherland Paper Co.	2,732,114	"
Tomato tray	Meyer Glazer	2,732,120	"
Display box	Dennison Mfg. Co.	2,732,121	"
Protective carton	Bradley & Gilbert Co.	2,732,122	"
Shockproof carton	Bradley & Gilbert Co.	2,732,123	"
Coating paper with thermoplastic material	K V P Co.	2,732,319	"
Suction pickup and transfer press for paper machines	Beloit Iron Works	2,732,772	1/31/56
Doctor assembly	Bird Machine Co.	2,732,773	"
Manufacture of paper bags	Carl Honsel	2,732,774	"
Paperboard packing case	Wilbro Corp.	2,732,995	"
Radio tube cartons	Federal Paper Board Co. Inc.	2,732,996	"

Nostradamus* says:

Time is money

Money is income

Income is reward...

*French forecaster 1503-1566

... and *you* will be rewarded for looking to TESTING MACHINES, INC., for the finest in standard testing equipment and keeping your eye on the TMI crystal ball for the last word in future developments. You will have an improved product—increased sales—increased profits.

THESE *NEW* INSTRUMENTS WILL BE OF INTEREST TO YOU:

- Papric Dirt Counter
- Initial Wet Strength Tester
- Optical Fibre Projector
- Sisalkraft Internal Bond Tester
- KBB Size Tester
- Vanceometer Oil Absorption Tester
- Marconi Moisture Meter
- Motorized Micrometers

Our years of long experience with testing instruments assure you of reliable service. WRITE NOW for information and recommendations on above machines.

FREE—have your name placed on our mailing list to receive latest bulletins and developments—no obligation!

TESTING MACHINES, INC.
MANUFACTURERS AND DISTRIBUTORS OF THE FINEST TEST EQUIPMENT.
123 West 64 Street, New York 23, New York

what you need to do the job

Paper characteristics, as they are determined or affected by felts, is a highly specialized area in which we can help *you*.

That's why we say, "You get *more* than felts from Appleton." That's why our field people are backed by competent, creative research facilities.

Put *your* problems up to the Appleton man. It's his job to see that *you* get what *you* need to do *your* job!

MR. AND MRS.—*The machine with a heart is yet to be invented. We don't underestimate the importance of our modern, precision equipment in making felts you can depend on. But it takes people, too . . . like Bill and Dorothy Sommers, whose combined 46 years of experience and devoted skill pay off for you on the paper machine.*

Appleton felts

1881 75 years 1956

APPLETON WOOLEN MILLS

a working partner with the paper industry

APPLETON, WISCONSIN

FOREIGN ABSTRACTS

Fig. 1

Fig. 2

The viscose process; an electron microscopic study

This is the first paper in a series from the Swedish Forest Products Research Laboratory. After reviewing briefly the viscose process, the fine study of native and regenerated cellulose, and the state of solution of cellulose xanthate, the authors report on an extensive electron microscopic study which encompassed the entire viscose process. The different stages in forming viscose were followed, using a sulfite pulp, a prehydrolyzed kraft and a cotton linters pulp. Fibrous reaction products were regenerated directly from viscose with sulfuric acid, as well as very thin films. Water-swollen specimens were dispersed by ultrasonic treatment, and then prepared on

Fig. 3

supporting membranes, shadowed with gold-manganin. A few of the 22 excellent electron micrographs are reproduced herewith. Fig 1 shows a chemical grade of sulfite pulp disintegrated with ultrasonic radiation. Fig 2 shows cellulose regenerated from alkali-cellulose after aging. Fig. 3 shows cellulose from fibrous cellulose xanthate, from a sulfite pulp. Thirty-five references are given. B. G. Ranby, H. W. Giertz, and E. Treiber. *Svesnk Papperstidn.* 59, 117-127 (1956) (in English).

"Round nitrogen" in ammonium bisulfite pulping

Spruce chips (80 g.) were digested with 350 cc. of a cooking acid containing varying amounts of ammonium bisulfite. Two hours were required to bring the system to 110°C., and this temperature was maintained for 2 hours. Thereafter, the time required to reach the maximum temperature of 148° was 3 hours, and this temperature was continued for varying time periods ranging from zero to 1.5 hours. The total nitrogen and the "free nitrogen" were then determined in the various spent liquors, due correction being made for the small amounts of nitrogen originally present in the wood.

The free nitrogen was determined by means of a rapid steam distillation of the ammonia (after treating the liquor with 0.1*N* sodium hydroxide). The total nitrogen was determined by the Kjeldahl method, and the "organically bound" nitrogen was then determined as the difference between the total and the free nitrogen.

Depending on the length of time that the cook was kept at 148°, the bound nitrogen varied from 1.1 to 8.6 per cent. The longer the time period at maximum temperature the more nitrogen was bound. Besides this bound nitrogen some ammonium ions could also be held by the cation exchange properties of the pulp, thus giving rise to appreciable losses in nitrogen.

Judging from model experiments with glucose, mannose, and xylose cooked with ammonium bisulfite under comparable conditions, it appeared that the sugars or their degradation products were instrumental in removing nitrogen from the system, although other compounds may also serve to bind nitrogen. Parallel digestions with sodium bisulfite showed that the yields of the pentoses and the fermentable sugars, and the subsequent alcohol formation were all higher than when ammonium bisulfite was used. Nine tables and 11 references are given. Olaf Samuelson and Nils Herman Schöön. *Svensk Papperstidn.* 58, 894-899 (1955) (in English).

Crystal violet base in determining carboxyl groups in cellulose

The base of Crystal Violet (C.V.B.) in benzene solution is taken up by free carboxyl groups in thoroughly dried cellulose or pulp. A very large excess of C.V.B. must be used and ample time of contact must be given so as to insure complete coverage of the acid groups. Thus two grams of the cellulosic material was dried at 105°C. and then shaken 5-6 hours with about 40 mg of C.V.B. in 200 cc dry benzene. In general 50-70 times the required amount of base should be used. The pulp is then washed 3-4 times with dry benzene, and dried to constant weight at 105° and extracted with methanol until the residue is colorless.

The methanol extract is evaporated to dryness, and the resulting dyestuff (formed due to oxidation of the base) forms a violet film in which the nitrogen is determined by a micro-Kjehldahl method. This gives an index of the carboxyl groups present initially. Inasmuch as only *free* carboxyl groups retain the C.V.B., the ash content of the original sample may be very important. This is especially true when cations originally formed salts with the carboxyl groups.

Often the ash content is correlated with the so-called "glucose number". This is the term applied to the *number* of *glucose groups* in the cellulose sample corresponding to *one free carboxyl group*. The smaller the percentage carboxyl, the greater will be the glucose number and vice-versa. As an example, a pulp which contained 0.37 per cent ash showed a free carboxyl content of

only 0.0036 per cent, and a glucose number of 4960. When deashed with acetic acid, the free carboxyl rose to 0.0532 per cent and the glucose number dropped to 531.

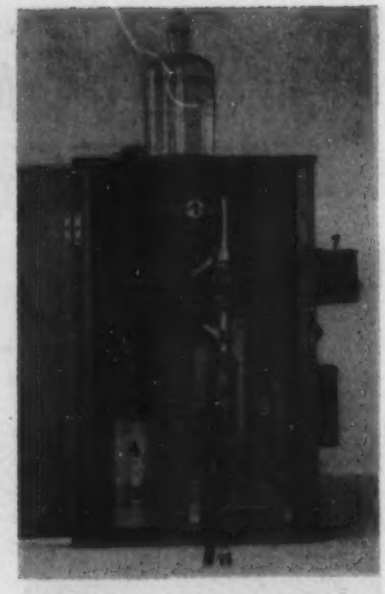
Studies indicate that the new technique can be applied even more readily to the so-called "inclusion celluloses" described by Staudinger. In such samples the initial water is displaced by an alcohol or by acetone, and these solvents are in turn displaced by non-polar solvents like benzene, cyclohexane, *et al.* and then dried. However the final solvent (like benzene) is often retained tenaciously by the cellulose even after drying to constant weight. One of these inclusion samples which contained 0.01 per cent ash showed a carboxyl content of 0.071 per cent and a glucose number of 391. In this case much less C.V.B. was required in making the determination and the time of contact between the cellulose and the C.V.B. solution was 2.5 hours instead of the usual 5-6 hours. The C.V.B. method gave results very similar to those obtained by O. H. Weber's method [cf. *J.prakt. Chem.* 158,33 (1940)]. The reproducibility of the C.V.B. method is very satisfactory. M. Rebek, K. Klaus, and H. Baumgartner. *Das Papier* 10,91-97 (1956) (in German).

Water adsorption and swelling of Norwegian fiberboards

Boards from three Norwegian mills, were conditioned thoroughly at 65 per cent relative humidity and 20° C., and then tested for percentage water absorption and percentage increase in thickness after immersing for 2 and for 24 hours at 20° C., in various "qualities" of water and then drying the surfaces. These included tap and distilled water (boiled and unboiled), water containing 30 g. sodium chloride per liter, a hardwater containing 130 mg lime per liter (pH = 9) and six different buffer solutions ranging in pH from 2.5 to 8.0. Only when the water was buffered did the pH remain nearly constant during the tests.

The various values for water absorption and swelling were roughly the same irrespective of what water was used, unless the pH rose above about 6.8, during the course of the test. Above pH 7, the percentage absorption usually showed a marked increase. The lowest absorption was usually obtained with the concentrated solution of sodium chloride. There were no very marked differences in water absorption or swelling when tap or distilled water was used. At pH below 7, the highest percentage absorption within 24 hours was about 25.9. The greatest increase in thickness was about 17.7 per cent. Much higher values were obtained when the pH reached 8-9, and hard water or alkaline buffer solutions should not be used in such tests.

Taking all the results into consideration, the author believes that a standard procedure can be devised using distilled or ordinary tap water (with a pH below 7). K.Helge. *Norsk Skogind.* 10, No. 3,96-7 (1956) (in English).



Permanence of paper

A new chamber was used in the artificial ageing of paper sheets; this is shown above. The motor (1) serves a device that introduces oxygen through high pressure piping (2) into the chamber used for ageing. Valve (3) permits partial shutting off of the oxygen steam, and of directing it through water or a suitable salt solution (4). A heating unit (5), a contact thermometer (6) and a relay (7) permit the regulation of the relative humidity throughout the ageing process. The lower part of (2) is connected with a heating jacket (8). Another contact thermometer (9) helps in regulating the heat given off, and of keeping a constant temperature. At the very base of (2) is a short nipple (10) connected with the rubber tubing (11) which is connected through a bubble counter with the oxygen tank (not shown in the figure).

The ageing tests were made over various time periods at 37°C., and 75 per cent relative humidity, using 19 different paper sheets. Some of these were made entirely from rag stock. Others were made from mixtures of rag and wood pulp, whereas others were made from wood pulp alone. At times several types of wood pulp were mixed in the same sheet. For comparative purposes, these same papers were also submitted to the "American rapid ageing test" (involving a 3-day heating period, at 105°C).

The physical and chemical properties of the original sheets were compared with those aged by the new method (over periods of 45, 90, 135, and 180 days) and by the rapid ageing test. The properties studied included: breaking length, folding endurance, burst, initial tear, brightness, alpha-cellulose content, copper number, and average degree of polymerization. Some data are also given for pH. The data seem to indicate that the new ageing technique over a period of 180 days gave the most satisfactory means of measuring the permanence of a paper sheet. At times the results could be correlated with those obtained by the rapid ageing test, but the new and longer technique brought out damaging effects far more sharply than did the shorter test.

The results are shown graphically and in the form of tables. Perhaps the most important factor affecting permanence is the average degree of polymerization of the initial sheet, which, to insure proper durability, should be at least 1000-1200. Other important properties are a high alpha cellulose content (over 90 per cent) and a relatively low copper number (less than 1.5). The pH of the finished sheet is also important, and should not be too low. Other valuable criteria regarding permanence are furnished by noting the decreases in folding endurance and tear on protracted ageing. Changes in breaking length were sometimes found valuable. Apparently papers made from kraft pulps showed durabilities that were quite comparable with those shown by papers made exclusively from rag stock. Reliance cannot be placed on the determination of single properties (such as final breaking lengths, tear, *et al*).

The results of this comprehensive study are discussed fully. Ten tables, eight graphs, four figures and 23 references are included. Max Faulhaber and Kurt Pietrzyk. *Wochbl. Papierfabrik* 84, 75-82; 111-117; 147-153; 183-187 (1956) (in German).

Dithionites (hydrosulfites) used in bleaching groundwood

Peroxides or dithionites have in large measure replaced other chemicals used in bleaching mechanical pulps. Although peroxides may lead to a somewhat higher brightness than does sodium dithionite, the latter offers the following advantages. The time of operation is shorter; sodium dithionite requires 15-30 min., whereas the peroxides require several hours. The cost per point gain in G.E. brightness is lower for the dithionite than with peroxides. The dithionite is the more easily applied; requires fewer precautions and less equipment than do the peroxides. Zinc dithionite appears to be of little interest to the pulp maker unless it is used very promptly and manufactured directly in the mill where it is to be used.

The author claims that reversion in bleached pulp is no greater when dithionite is used than when the peroxides are the bleaching agents. Admittedly in either case reversion does occur. Satisfactory results were obtained with dithionite when the pulps were thoroughly washed after bleaching and when treated with sequestering agents for iron and copper (such as sodium tripolyphosphate). Under such conditions the gain in G.E. brightness could reach 8-10 points.

Tabulated data are also given for such bleaching agents as sodium bisulfite and calcium and sodium hypochlorite. In all cases the dithionite showed practical advantages over the others. Dithionite bleaching was found advantageous when the pulps were to be used in newspaper manufacture. H.Pellequer. *Papeterie* 78, No. 3, 139, 141, 143, 145, 147, and 149 (1956) (in French). The paper is also given in somewhat abbreviated form in Spanish in this same issue.

NEW PRODUCTS

These items are numbered for your convenience. Further information on the various products described may be requested at no obligation through our Readers' Service Dept. Use the business reply card in this issue.

11/ Use readers' service card.

Paint hammer

A paint hammer for marking cut logs is reported to mark four times as many stacked logs per hour and save 75 out of every 100 gal. of paint used now.

A pint can of paint clamped like a hammer head in a bracket at the end of an 18-in. handle is fitted with a porous applicator which oozes just enough paint to make a mark. The log marker's motion thus becomes a continuous tapping and there is no wasted motion or paint. *Nelson Co.*

12/ Use readers' service card.

Logging machine

Result of four years' development financed by a group of pulp and paper companies is the new pulpwood logger announced by the Woodlands Section of the Canadian Pulp & Paper Association. The machine is the first ever developed for the removal of pulpwood from wooded areas over rough terrain. It is 18 ft. long and 9 ft. high, and is described by engineers as "articulating and oscillating", factors which enable it to keep all four wheels on the ground regardless of topography. A universal joint midway between front and rear wheels permits front wheels to swing around at a 45° angle with rear wheels.

The logger has 4-wheel drive, 4-wheel brakes, and front and rear wheel steering. *Clark Equipment Co.*

13/ Use readers' service card.

Adhesive

A new adhesive has been developed which makes it possible to bond polyethylene to chip and kraft board in the manufacture of packaging envelopes and polyethylene laminated bags and boxes.

It will adhere polyethylene to surfaces which cannot be cemented with conventional adhesives. Because of its flexible plastic base, it will not crystallize, and has excellent shock resistance and ageing qualities. *Adhesive Products Corp.*

14/ Use readers' service card.

Dust collector

A newly designed unit to control fumes, odors and microscopic solids is engineered to remove low and sub-micron sized particles from exhaust gases at extremely high efficiency. In test situations, the unit has performed at 99.8 per cent efficiency with dust loadings at five grains per cu. ft. and 70 per cent of the material below five-micron particle size. *Johnson-March Corp.*

15/ Use readers' service card.

Expander

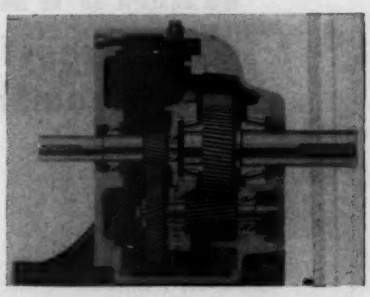
A 7-in. expander which will handle widths up to 210 in. is adjustable—from straight to maximum spreading—while the machine is operating at full operating speed. The ready adjustability is adaptable to straightening out bowed felt seams, wrinkles, welts, baggy or cockled edges in the paper after tub sizing, and may also be used to control the shrinkage rate of the sheet passing over the dryers. This unit gives mill men immediate control to rectify wrinkling and spreading problems as they occur on paper machines and laminators, as well as in sizing, coating and waxing operations. *Mount Hope Machinery Co.*

16/ Use readers' service card.

Globe valves

A new line of bronze globe valves, rated at 200 lb. steam pressure or 400 lb. pounds water, oil and gas, answers the need for a higher pressure, throttling globe valve.

The bodies and bonnets of the new valves are made of high-grade valve bronze, which is exceptionally close-grained, of high density, strong and corrosion-resistant. They have the same exclusive elements of valve design which enabled Lunkenheimer's original line of globe valves to establish a record of fine service in on-the-job tests. "Brinalloy", a seating metal developed by the company, and the flat-seat design of the valves are two important features. *Lunkenheimer Co.*

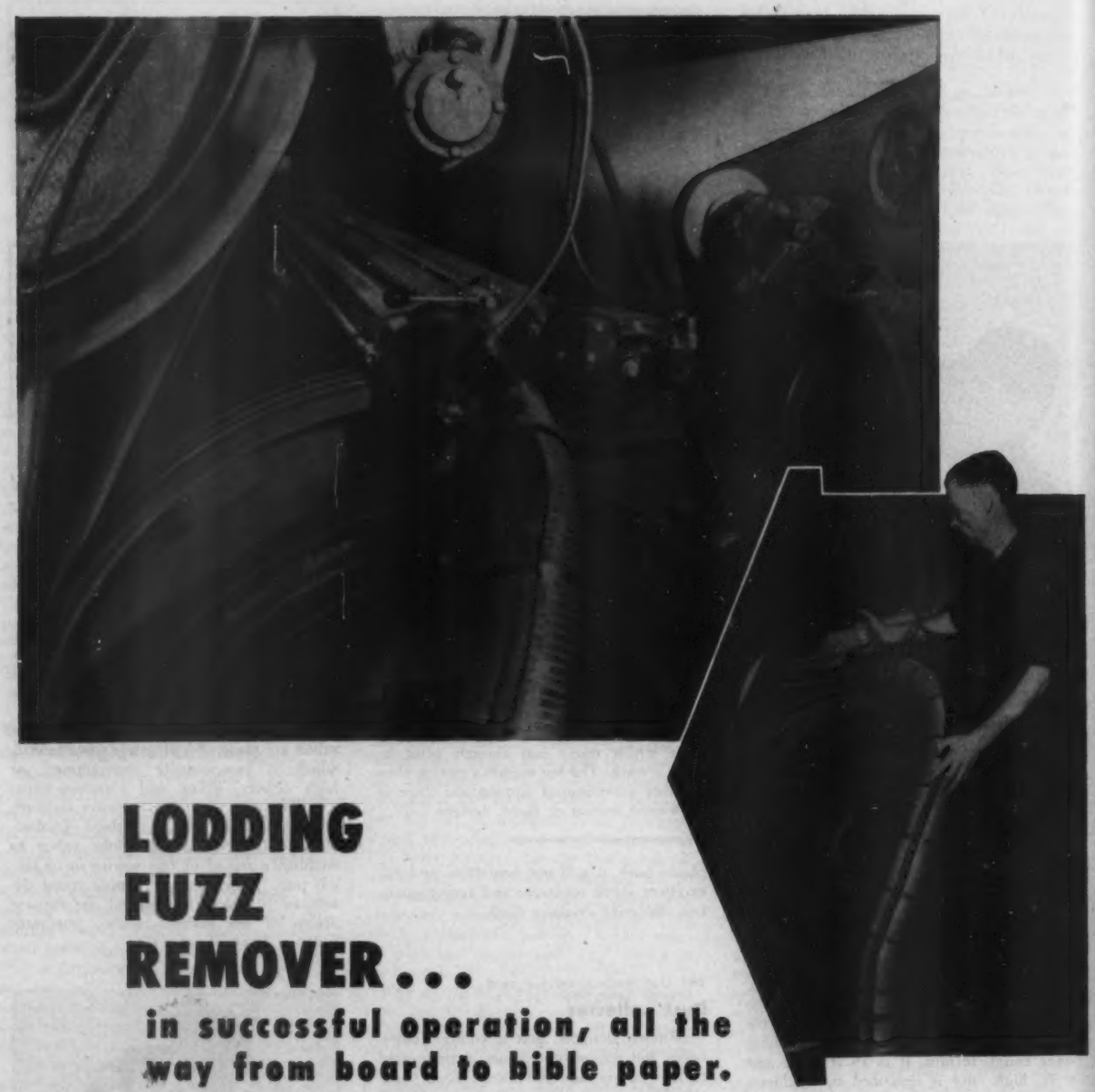


17/ Use readers' service card.

Helical gear drives

A new line of in-line helical gear drives offer a high degree of standardization with ability to stand up in heavy duty service. Double reduction drives are available in ratios from 6.2 to 1 through 38.4 to 1, with capacities up to 118 hp. Triple reduction drives come in ratios from 47.1 to 1 through 292 to 1, up to 20 hp.

Space requirements and layout problems are minimized by locating input and output shafts in the same horizontal and vertical



LODDING FUZZ REMOVER . . .

in successful operation, all the way from board to bible paper.

When the Lodding Fuzz Remover was installed in this mill a paper maker's age-old problem was solved. A series of jets scientifically put to work was the answer to the fuzz nuisance in the air and on the sheet.

Result: a better sheet, free from scabs and lint.

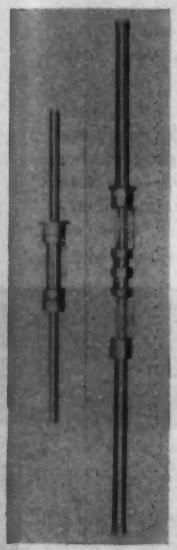
LODDING ENGINEERING CORPORATION
WORCESTER • MASSACHUSETTS

New Products . . .

plane. All moving parts are splash lubricated and permanently aligned. The pinion is straddle-mounted to provide strength to cope with shock, reversing or heavy loads. One-piece cast iron housings prevent oil leakage. *Link-Belt Co.*

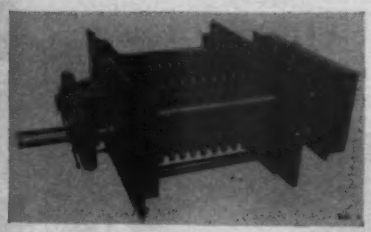
18/ Use readers' service card.

Self locking shaft



A new self locking mill roll unwinding shaft is entirely mechanical and needs no compressed air. Originally designed for use on automatic rewinding machines, it is now available for any machine where unwinding parent rolls are required.

The spindle comes in various sizes, with each size having a range of web widths. In operation, the spindle shaft is inserted into the mill roll core, to a flange stop, and automatically locks itself. *Schultz Eng. Corp.*



19/ Use readers' service card.

Double-roll grinder

A new sump-type, double-roll grinder for sizing solid materials conveyed in materials handling systems is designed for heavy-duty loads and for installation in a sump, located either below or above floor level.

The double-roll construction offers several advantages; it can handle larger pieces, the desired maximum size of end product is maintained and wear is less because sizing is accomplished by applying pressures at a few points of contact rather than by attrition.

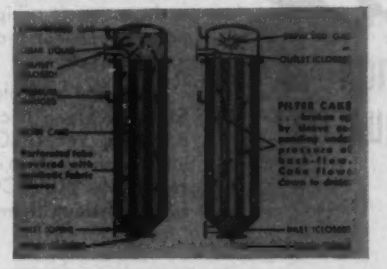
The grinder rolls are of manganese, and teeth are integrally cast so individual ones can be replaced by being burned off and new ones welded in place.

The grinder handles either wet or dry material and can be operated with rolls submerged. *Allen-Sherman-Hoff Co.*

20/ Use readers' service card.

Polyethylene resin

Improved qualities, attributable to higher crystallinity, characterize this new polyethylene, "Alathon" 34, which is designed for film applications where greatly increased clarity, stiffness, sparkle and high impermeability are required. Tests show that the resin will be particularly useful in soft goods packaging. Its properties will also enhance its usefulness as a coating for paper, foil and other substrates. Its stiffness, plus resistance to heat distortion, will make it an excellent resin for bottles and containers. *E.I. du Pont de Nemours & Co.*



21/ Use readers' service card.

Tubular filter

This tubular filter builds up air pressure at the end of the filtering cycle and uses the pressure for a sudden back-surge to clean the filter. No extra devices are used; the filter shell itself acts as the pressure chamber and the arrangement of regular valving provides the controls. The use of filtered water for cleaning and the need for back flow pumps are eliminated. Vertical operation reduces floor space needed.

The filter is offered in a wide range of materials with lined or unlined chambers. *Industrial Filter & Pump Mfg. Co.*

22/ Use readers' service card.

Radiant heating units

These new ovens and oven sections make product temperatures up to 1000° F. practicable. Recommended for short cycle operations required highest intensity is the new quartz lamp infrared section. A rated burning life of over 5000 hours make it ideal for paper processing, where shutdown time must be kept to the minimum. A great advantage is the instantaneous speed with which it reaches maximum heat.

The new radiant rod equipment, incorporating sheathed metal elements, meets the industry's need for an efficient far-infrared unit in a cost-saving design. *Fostoria Pressed Steel Corp.*

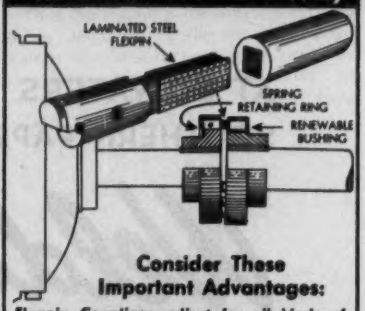
23/ Use readers' service card.

Disintegrator

This new line of disintegrators is suitable for mounting in reaction vessels and for the dispersing of liquids under pressure. The units are also adapted to the uniform low temperature size reduction and mixing of difficult-to-handle pasty masses.

Thorough cleaning and sterilizing is easily accomplished. The units are con-

STOP BEARING FAILURES
...shaft misalignments
the FLEXPIN COUPLING Way



Consider These Important Advantages:

Flexpin Couplings adjust for all kinds of shaft misalignments in all directions.
Act as safety device; prevent motor and machinery damage.
Expect and get 8 years and more service life from Flexpins.
Maintenance without moving connected shafts. No costly shut-downs.
. . . Easily mounted, aligned. Connected without special tools. Run in either direction; no backlash. Noiseless. Simple and safe. Reasonably priced; quick shipment.
Write today for Bulletin #53
(Parts for FRANCKE Couplings)

SMITH & SERRELL INC.
FLEXIBLE COUPLINGS
205 WASHINGTON ST., NEWARK 2, N. J.

Convert Logs into High-Quality Chips

CARTHAGE NORMAN CHIPPER

produces smooth, uniform chips — clean cut and low in sawdust. Multiple-knife design results in steady pressure on the log — prevents chattering. Heavy-duty construction — low maintenance costs. Also Carthage Standard Chippers.

Write for Complete Information

CARTHAGE MACHINE COMPANY
CARTHAGE, NEW YORK

AT BOWATERS SOUTHERN PAPER CORP.

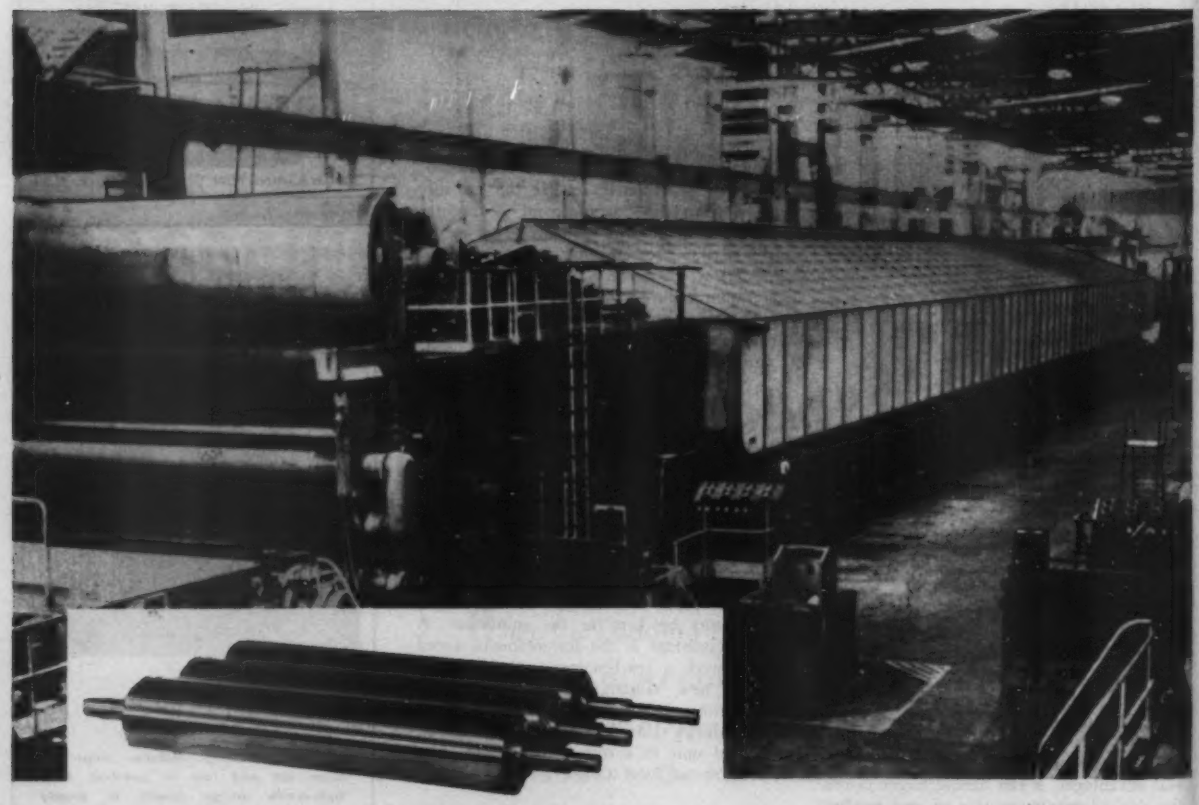
Weldco

SPEEDS UP PRODUCTION... MAINTAINS HIGHER QUALITY!

• Modern, high-speed paper production calls for the finest, newest, most efficient equipment. So when Beloit Iron Works designed two 256" Newsprint Machines for Bowaters Southern, WELDCO Monel Roll Covers were specified for the Auto Guide, Stretcher, and Wire Rolls. Ten rolls, 18" diam. x 21'4" face . . . the largest rolls of this type ever covered . . . were coated with 3/16" Monel.

You'll find WELDCO-Covered Rolls in many other mills, too, because they offer maximum corrosion-resistance, reduce friction, increase felt life, and lessen wear on fourdrinier wires. Their smooth, highly-polished surface won't chip, peel, crack, or blister — gives many years of economical service with very little maintenance.

Both new and old rolls can be covered with Monel, Stainless Steel, Nickel, Inconel, or other alloys, by the patented WELDCO "Pressure Welding" process. For your next machine — new or reconditioned — be sure to specify WELDCO Rolls. Ask your paper machinery builder about them, or contact us direct.



THE YOUNGSTOWN WELDING AND ENGINEERING COMPANY

WELDCO

3727 OAKWOOD AVE. YOUNGSTOWN 9, OHIO

structed to allow for easy changes in speed and rotor diameter. Rotors are suspended from bearings for quick removal for cleaning and changing. The line is available in stainless or carbon steel as standard items, or in other required materials on special order. Rotor sizes run from 2 to 24-in. with horsepower from ½ to 200. *Rietz Mfg. Co.*

24/ Use readers' service card.

Variable speed motor

A new variable speed, internally-geared varidrive motor, with take-off shaft and motor on the same side, is ideal for low-speed applications requiring variable speed where weight distribution and limited space is a factor. The units are available up through 5 hp in both upright or horizontal assemblies with either dripproof, totally-enclosed or explosion-proof motors. The motors are extremely compact and provide very slow speeds and high torque without the use of separate gear boxes, speed changers, or other extraneous material. *U.S. Electric Motors Inc.*

New Products . . . . . .

25/ Use readers' service card.

Wax-polymer concentrates

A new series of wax-polymer concentrates features the use of pliolite with either paraffin or microcrystalline waxes. These coatings are designed primarily for paper converters where low viscosities and high polymer concentration are important. Excellent bond strength, absence of tack and improved adhesion to paper or foil are among its other features.

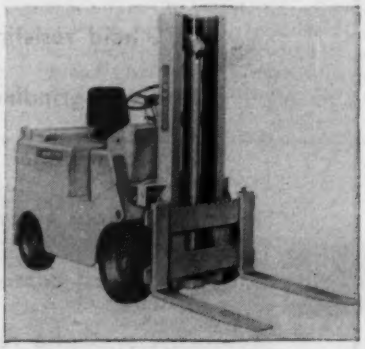
Users can reduce the concentrates to the desired concentration in their own plants by the addition of paraffin or microcrystalline. *The Borden Co., Chemical Div.*

26/ Use readers' service card.

Paper sampler

A new sampling technique guarantees that a sample of paper is the same when tested as when taken. The device, consisting of two metal platens joined by a spring hinge, is inserted under the outer plies of rolls or skids and is clamped about inner plies. Samples, shielded from the atmosphere, are then taken by cutting or tearing around the platens and immediately slipped into a special moisture-vapor resistant pouch.

Thus the sample is taken before exposure to the humidity in the air. The pouch protects the sample until it is used, and some tests may be performed while the sample remains in the pouch. *Paper Industry Instruments Inc.*



27/ Use readers' service card.

Fork lift trucks

This series of five fork lift trucks, including gasoline, LP-gas and diesel-powered models, incorporates new engineering and design elements planned to lend greater efficiency and versatility to a wide variety

Stadler, Hurter
& Company
CONSULTING ENGINEERS

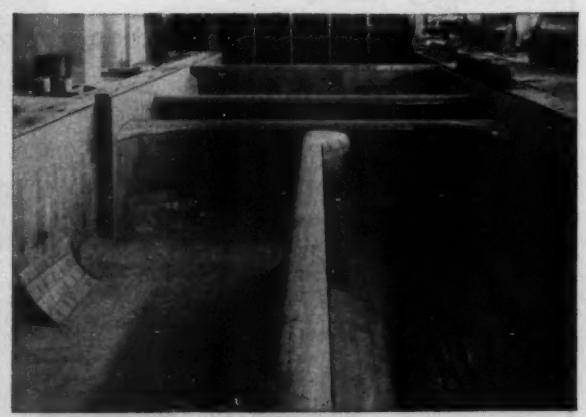
Specializing since 1923 in all phases of design, modernization and expansion of pulp and paper mills from forest to finished product.

HEAD OFFICE: DRUMMOND BLDG., MONTREAL
New York Office: 76 Beaver Street

Ten Publications for Papermakers

Pulp and Paper, Volume 1 (Casey)	$18.00
Pulp and Paper, Volume II (Casey)	18.00
Paper and Paperboard Making (Williamson)	6.00
Drying of Paper on the Machine	1.50
Lessons in Papermaking—Part 1	1.50
Lessons in Papermaking—Part 2	1.50
Notes and Observation on Beaters	1.00
Trouble on the Paper Machine	.75
Pulp Bleaching (A Symposium)	.50
Technology of Papermaking Fibres	.50

Mail your order with payment to:
The PAPER INDUSTRY
431 S. Dearborn Street, Chicago 5, Illinois



Kalamazoo GLAZED TILE
TANKS, CHESTS, LININGS
. . . any shape, any size

Engineered and erected by experts with over 25 years' practical experience. Highest quality glazed tile. Corrosion resistant, easy to clean, durable. For new construction or for remodeling existing facilities.

TILE TANK DIVISION
Kalamazoo TANK and SILO CO.
627 HARRISON ST., KALAMAZOO, MICHIGAN

Who Makes Them?

Where can you find—quickly—information on where to buy . . . . .

. . . acid resisting linings?

. . . roll grinding machines?

. . . centrifugal pumps?

. . . paper stock washers?

. . . pitch controls and removers?

. . . synthetic resins?

. . . sulphur recovery systems?

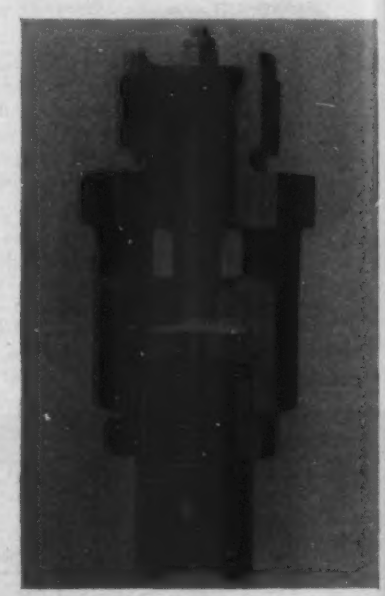
You'll find the answers to these questions and to more than 4600 others in the Buyers' Service Section of your

Paper and Pulp Mill Catalogue and The PAPER INDUSTRY are published by

FRITZ PUBLICATIONS, Inc. 431 SOUTH DEARBORN STREET CHICAGO 5, ILLINOIS

New Products . . . . . .

of materials handling operations. Lifting capacities range from 6000 to 11,000 lb. A choice of standard or automatic transmission is available, and power steering is optional original equipment or may be installed after delivery. *Towmotor Corp.*



28/ Use readers' service card.

Spray valve

This non-scaling spray valve with valve stem and guide sealed against liquid is designed for applications such as feedwater heaters, deaerators, hot process water softeners, cooling towers, aerators, degasifers and spray ponds. A special elastic sleeve permits free action of the valve and seals moving parts from contact with sprayed liquids to eliminate formation of scale deposits on the valve stem.

Introduced in 1 and 1½-in. sizes, the valve construction is of bronze or stainless with approximate pressure drops from 4 to 5 psig at maximum flow. The elastic seal will withstand temperatures to 450°F. *Griggs Machine Co. Inc.*

29/ Use readers' service card.

Flushing drop feed oiler

This unit was developed to meet the lubricating needs of newer high speed heavier load machines. It provides a simple means to automatically flood or flush a bearing with a definite amount of oil at the starting period, after which oil will feed drop by drop. The quantity of oil provided for flushing is fixed while drop feeding can be adjusted. After the oiler is shut off it will automatically reset itself for the next operating period.

The unit is solenoid operated although manually operated units can also be furnished. Transparent reservoirs permit a

visual check on the oil supply. Self-closing filler caps are provided and oil-resistant rubber gaskets form a positive seal preventing leakage. *Oil-Rite Corp.*

30/ Use readers' service card.

Pipe sealing compound

A new chemically inert pipe joint compound that will positively seal practically all known highly corrosive liquids and solvents for service up to 212° F. has a base of duPont Teflon. The material is impervious to all types of hard-to-handle fluids and possesses a very low coefficient of friction which reduces wrench torque and permits connections to be drawn up to a greater degree of tightness.

The non-adhesive quality of Teflon and the non-hardening characteristics of the compound allow the connection to be quickly disassembled even after years of service. The compound is particularly adaptable for use on aluminum, stainless, monel or plastic pipe. *Crane Packing Co.*

31/ Use readers' service card.

Water deionizer

This portable ion exchange water deionizer is non-mechanical, pressure operated and connects to any faucet to produce deionized water instantly at a flow rate as great as 2 gpm. An important feature is jet feed with up-flow through the resins to prevent channeling, insuring maximum efficiency. The filtering resins change color to indicate exhaustion and are easily replaced. Grain removal capacity is approximately 1750 grains as NaCl. Another model, with flow rate of 1 gpm has grain removal capacity of about 900 grains as NaCl. *Crystal Research Laboratories Inc.*

32/ Use readers' service card.

Hydraulic relay

This hydraulic relay is a high precision tool, capable of high frequency response. It may be installed in any position and requires no adjustment. The standard unit may be operated at hydraulic pressures to 750 psi without auxiliary devices.

Any metering device that produces a signal force in the magnitude of a few grams, and is proportional to deviation, makes of the relay a powerful automatic control for the metered circumstance.

It is available as a component, or will be furnished with complete signal systems, pump units and accessories for specific automatic control applications. *Hague Regulator Corp.*

33/ Use readers' service card.

Wear plates

Replaceable hardened wear plates for chipper discs have a hardened surface (3/16-in. depth) of ball bearing tool steel, clad to a mild steel backing. This combination is designed to withstand heavy shock, have a much longer life than plates made of ordinary material and deliver more uniform chips.

Re-grinding is not necessary for periods of six months or more; the low rate of wear assures minimum replacement costs. The plates are made to specification, ground and drilled ready for installation. *Ohio Knife Co.*

34/ Use readers' service card.

Solenoid valve

The "in-line" construction of this two-way direct solenoid controlled valve makes it easy to inspect and service. All control parts can be removed in one small assembly, without disturbing the piping, by loosening one nut. Primarily for ac current applications (both pressure and vacuum), this normally closed valve is available in standard pipe sizes from ½ to 2 in. It has only two moving parts, assuring a positive, high-speed action with short plunger travel. Non-corrosive throughout, it can be controlled by a relay or a microswitch, and can be mounted in any position. *Airmatic Valve Inc.*

35/ Use readers' service card.

Color printing

Process printing using multicolor lithography, gravure or flexographic methods, is now in use for the manufacture of corrugated boxes. Equipment is available which permits the corrugated manufacturer to use preprinted liner boards. Commercially run samples are available. *Electronic Machine Parts Inc.*

Keep your wood room operating at
Peak Efficiency
with
B&B
HORNET CHIPPERS
custom made
For over twenty-five years, Lodding has advanced principally because we recognize the service requirements of our customers. Our philosophy has always been to sell results. This same reasoning applies to our knife business. Our chippers and other knives for the paper industry are sold on a service-result basis, the same way as our doctors have been sold.
B&B DIVISION
LODDING ENGINEERING CORP.
UNION • NEW HAMPSHIRE

You can't beat HAMILTON Felts . . .

for uniform squeeze!

Woven endless or seamless, the uniform thickness, texture and finish of Hamilton Felts transmit the full force of the presses to every square inch of the sheet . . . and leave a feltmark.

That's *one* of the reasons why master papermakers, since 1858, have preferred Hamilton Felts for the manufacture of papers and boards of every type.

WANT A NEW STETSON?

• *Suggest A New "Headpiece" for Ham Feltz*

HAM FELTZ SAYS:

"Send me your idea (a very rough sketch will do) — of the type of headpiece the best wet-end operators will wear this summer. If I wear it in future ads I'll send you a new hat (your size, of course)."

Hamilton
FELTS

MIAMI WOOLEN MILLS
Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO

NEW LITERATURE

Books

CHEMICAL SAFETY SUPERVISION. By Joseph Guelich. Reinhold Publishing Corp. New York, N.Y. 6 x 9½. 221 pages. $4.50. (Less in quantity.)

This handbook of safety was designed primarily for supervisors and foremen who are concerned with the use, manufacture or handling of chemicals. In plain, straight forward style it tells how to cut down on carelessness and develop safe handling habits among the men who work with chemicals.

The cartoon illustrations emphasize main points made in the text, which explains the best methods of teaching the use of chemicals to new men, protecting men from hazards, moving and storing chemicals, first aid, scheduling physical examinations, investigating an accident, and other safety concepts.

Safety check lists, sources of help with safety problems, the psychology of instilling safe working habits and the company's responsibility to its neighbors are a few of the unusual items presented.

SUCCESSFUL HANDLING OF LABOR GRIEVANCES. By Bertram R. Crane and Roger M. Hoffman. Central Book Co. Inc., 261 Broadway, New York 7, N. Y. 307 pages. $5.95.

This book describes and examines the industrial grievance from the point of origin to the point of final decision-making between the parties. The most successful and practical of techniques as used by management and labor are analyzed, and actual contracts are discussed clause by clause.

Suggested grievance codes, originated by the authors, and many grievance forms used by the country's leading corporations are presented.

The book was written to help labor and management settle their differences without the intervention of a third party. It gives practical information on handling labor-management problems from the point of view of management, the foreman and the shop steward.

PRACTICAL PAPER TECHNOLOGY. By William Bond Wheelwright. Callaway Associates Inc., 420 Boylston St., Boston 16, Mass. 5 x 6½. 102 pages. Paperbound. $1.75.

The second edition of a basic paper textbook which has gone through its first edition and two reprints is available in a paper-backed pocket-sized volume. A 14-page supplement—A Quiz Test on Paper—contains 144 questions which experienced paper men should be able to answer.

The manual is based on a series of lectures by the author, with chief emphasis upon paper properties and their relations to the requirements to be met in conversion and use, particularly in the graphic arts. It is intended as an elementary treatise bridging the gap between paper men and allied trades.

. There is a brief history of papermaking and descriptions of the various kinds of paper and practical manual and visual tests which can determine their properties. The latter section of the book deals with the peculiar needs and requirements of papers to be used in different printing processes and brief discussions of these processes.

Paper salesmen, who need to know the problems of their customers, are one group who will find this book useful.

USDA Reports

ANNUAL REPORT (1955), LAKE STATES FOREST EXPERIMENT STATION. Published by Lake States Forest Experiment Station, St. Paul 1, Minn. 8 x 10½. 85 pages. The report summarizes what the station has been doing during the past year and states its plans for 1956. Major projects now in progress are outlined with some of the findings. The publication output by station personnel in 1955 is also listed.

PULPING CHARACTERISTICS OF LAKE STATES AND NORTHEASTERN WOODS (Report No. 1675). Issued by U.S. Forest Products Laboratory, Madison 5, Wis. This report presents comparative data on the properties of pulps and papers produced by all the known processes from both hardwoods and softwoods, with emphasis on the possibilities of increased utilization of hardwoods and the less-favored softwoods.

PROFITS FROM PRUNING APPALACHIAN WHITE PINE. (Station Paper No. 65.) By R. A. Campbell. Published by Southeastern Forest Experiment Station, Asheville, N. C. 8 x 10½. 9 pages. This publication summarizes results of a 19-year test of healing and growth rate of white pines after pruning, and analyzes the profitability of the pruning operation.

PAPER AND PAPERBOARD MAKING

By HARRY WILLIAMSON

Consulting Engineer and Author of

LESSONS IN PAPER MAKING

Pocket size, cloth bound text book of 372 pages covering all phases of stock preparation and sheet formation including the fundamental principles of making paper on the fourdrinier machine and paperboard on the multiple cylinder machine.

The author has fulfilled a life-long ambition to translate nearly fifty years of practical experience in a book that will be useful to the practical papermaker, technologist and executive.

Price $6.00 prepaid with order

Published by

FRITZ PUBLICATIONS, INC.,

431 So. Dearborn Street, Chicago 5, Illinois

New Literature . . .

Manufacturers' Publications

These items are numbered for your convenience. Copies of the publications may be requested at no obligation through our Readers' Service Dept. Use the handy business reply card which accompanies this issue.

36/Use readers' service card.
Plastic Laminate. Garlock Packing Co. This bulletin describes a lining material, a laminate of plastic fused and flowed into a glass fiber cloth backing, which can be applied to inexpensive containers, tanks and pipes, making them cheaper and lighter than alloy metals.

37/Use readers' service card.
Pipe Strainers. Armstrong Machine Works. A two-page bulletin gives details of design features, all pertinent dimensions and prices of the eight sizes of cast semi-steel Y-type pipe strainers for pressures to 250 lb. and the six sizes of carbon moly steel strainers for pressures to 900 lb., temperatures to 900°F.

38/Use readers' service card.
Roller Bearings. Chain Belt Co. This 72-page catalog contains specification and data pages on all models of Shafer self-aligning roller bearings. Described are the Shafer self-aligning principle of concave rollers running between convex raceway, the Shafer microlock adjustment, the Shafer "Z" seal, etc.

39/Use readers' service card.
PVC Pipe Fittings. Grinnell Co. Inc. A comprehensive 12-page catalog deals with corrosion-resistant pipe fittings and flanges in normal impact grade and high impact grade, rigid, unplasticized polyvinyl chloride. Characteristics, advantages and limitations are given. Operating pressures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations, dimensions and weights, based upon latest available tests and field experience, are listed.

40/Use readers' service card.
Steam Traps. Yarnall-Waring Co. offers reprints of an article from Power magazine, "For Top Output, Size Steam Traps Right." The article contains helpful information and charts on steam trap application.

41/Use readers'service card.
Mechanical Seals. Crane Packing Co. An eight-page bulletin provides construction, service and application information, including representative installations and engineering details on the complete line of chemically inert mechanical seals for handling all types of acids, corrosives, solvents and gases.

42/Use readers' service card.
Plastic Pipe and Fittings. Alpha Plastics Inc. Complete data on normal impact unplasticized straight polyvinyl chloride and high impact unplasticized modified PVC, including properties, available sizes, corrosion resistance charts, drawings of fittings, fabrication directions, and price lists are given in this bulletin.

43/Use readers' service card.
Single-Stage Pumps. Ingersoll-Rand Co. An eight-page bulletin describes the re-designed line of the company's single-stage centrifugal pumps. Included are information on construction features, typical installation views, cross sectional views and an exploded view of component parts and dimensions. An interchangeability chart is illustrated to show the maximum interchangeability of parts throughout the entire line.

44/Use readers' service card.
Filtering. Multi-Metal Wire Cloth Co. offers the first issue of its house organ which will be issued regularly containing articles on the broad field of solids-liquids separation. Also listed are some recent Multi-Metal special fabrications and free literature available from the company.

45/Use readers' service card.
Circulation Outfits. Papermaking Equipment Co. An eight-page booklet discusses forced circulation of cooking liquor through pulp digesters, giving schematic layouts of circulation plants and features of the system developed by this company.

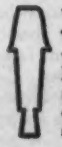
46/Use readers' service card.
CO_2 in Water. W.H. & L.D. Betz offer a technical paper on the determination of carbon dioxide in water by conductivity measurements. The paper describes a new method which is applicable to analysis of waterside deposits, treatment chemicals and organic carbon in water. The principle permits rapid, accurate analyses.

47/Use readers' service card.
Two-Stage Pumps. Worthington Corp. Boiler feed pump information for two-stage centrifugal type pumps is covered in this bulletin. Outline drawings, major features, a reference chart on suction and discharge diameters, are given along with information on elastic seal rings, casing, impellers and casing rings, shaft, shaft sleeves and stuffing box.

48/Use readers' service card.
Water Clarification. Graver Water Conditioning Co. offers a technical reprint on the operating factors and the selection of chemical treatment for water clarification. The article discusses the theoretical chemical problems of coagulation and goes into actual physical consideration of the process. A portion is devoted to a discussion of proper selection of coagulants available with a table comparing the characteristics of each. The Graver Jar Test procedure is described.

The Paper Industry
Professional and Business Services

Engineers
Industrial Plants • Textile & Paper Mills • Location Studies • Appraisals • Reports • Surveys
J. E. SIRRINE COMPANY
GREENVILLE SOUTH CAROLINA

MILL COGS

We make a specialty of "Ready Dressed" cogs which are READY TO RUN the moment driven and keyed. Write for circular "O" and instruction sheets free.

The N. P. BOWSHER Co., South Bend, Ind.

YOUR GUARANTEED CASH MARKET FOR SURPLUS MACHINERY
WITH IMMEDIATE REMOVAL FROM YOUR MILL
ROSS PAPER MACHINERY COMPANY
265 Passaic Street, Newark 4, New Jersey

ENGLISH ECCO CLAYS TRADE MARK CLAYS
UNIFORM • SUPERIOR • DEPENDABLE
English China Clays Sales Corporation
551 Fifth Avenue, New York City

CLASSIFIED ADVERTISING

PULP MILL SUPERINTENDENT

Wanted for 800 ton Kraft Pulp Mill in paperboard plant. Must be competent and experienced. Salary open. This position is with a large company and is a real opportunity for a capable person.

Address: Box 631

The Paper Industry

REPRESENTATION AVAILABLE

for chemical distributing concern. Wanted — HEAVY CHEMICAL lines for basic industry, including raw materials & compounded formulations, detergents, dyestuffs, disinfectants, acids, etc. Have experience and knowledge of No. New England area. Desire to act as mfr.'s rep. Box 632, The Paper Industry.

WANTED — MEN WITH EXPERIENCE ON FLAK TYPE PULP DRYERS

We offer:

1) An opportunity to join one of the leading and most progressive paper manufacturers in the country.
2) A position with unlimited potential — definite security.
3) Excellent living and working conditions — our new mill is located in central Florida, midway between Jacksonville and Daytona Beach.
4) A retirement plan to which all funds are contributed by the company.
5) Many benefits — i.e., Group Life Insurance, Hospitalization and Surgical Insurance, etc.

Send complete resume to Hudson Pulp & Paper Corp., Southern Division, Palatka, Florida, Attn: Personnel Dir.

Leather belt manufacturer wants mfr.'s agent established in pulp and paper industry to carry line. Most territories open. I. B. Williams & Sons, 180 N. Wacker Drive, Chicago 6, Ill.

CONFIDENTIAL EMPLOYMENT SERVICE

For paper and pulp mills and paper converting plants. Our service is rendered without charge to employers seeking executives. No fee to be paid by applicant until position is accepted. We will welcome an opportunity to be of service.

CHARLES P. RAYMOND SERVICE, INC.

294 Washington St. LIberty 2-6547 Boston 8, Mass.

WANTED

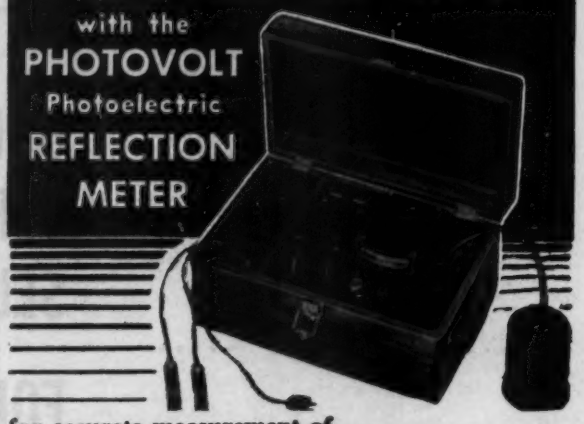
Two Product and Process Development Engineers to become part of our "Management team". Applicants should have an engineering degree. We prefer men experienced in Product and Process Development work in the paper field, either Tissue (napkins, towels, toilet tissue), or Kraft and Multiwall Sacks (gummed tape, grocery bags and sacks, wrapping). We offer:

1) An opportunity to join one of the fastest growing paper manufacturers in the country; a leader in several fields
2) A chance to participate in the building of a new Product and Process Development Department
3) A challenging position with unlimited potential — definite security.
4) Excellent living and working conditions. Our Southern Laboratory is located in Palatka, Fla. midway between Jacksonville and Daytona Beach. Our Northern laboratory is located a few miles away from Portland, Me., the largest city in the State.
5) A Retirement Plan to which all funds are contributed by the company.
6) Many fringe benefits, such as Group Life Insurance, Hospitalization and Surgical Insurance, etc.

Please send complete resume to Hudson Pulp & Paper Corp., 477 Madison Avenue, New York 22, N.Y., attn: Mr. D. L. Brody.

You Can Be Sure!

with the PHOTOVOLT Photoelectric REFLECTION METER



for accurate measurement of

Brightness and Opacity

of pulp and paper in terms of TAPPI specifications.

Also for *Gloss and Color*

tests on paper, cardboard, and other paper products.

Portable, reliable, rugged, simple to operate

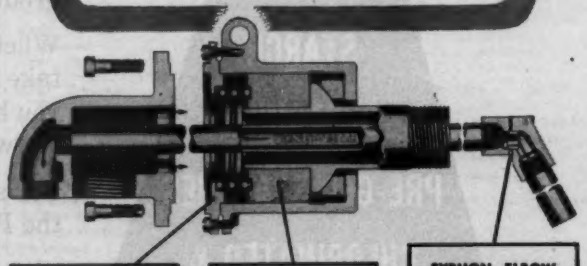
Also: Colorimeters, pH Meters

PHOTOVOLT CORP.

95 MADISON AVENUE NEW YORK 16, N. Y.

Johnson Joint

SELF-SUPPORTED TYPE with SYPHON ELBOW



ASSEMBLY PLATE — Holds internal parts in position when head is removed.

SELF-SUPPORTING — Needs no external supports of any kind.

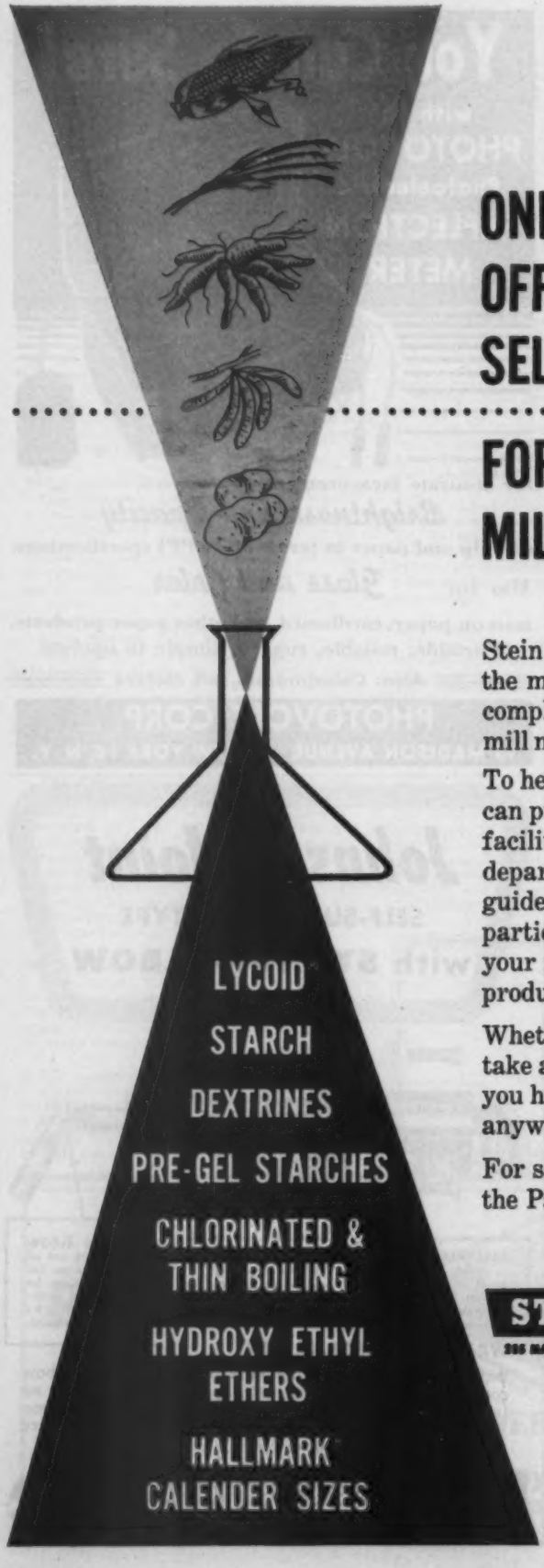
SYPHON ELBOW — Permits use of straight pipe for syphon. Can be inserted or withdrawn right through the joint.

WRITE FOR INFORMATION

Bulletin S-2001 has all the facts on this joint-and-elbow combination that supports itself, has no packing, needs no lubrication, outmodes unwieldy syphon pipes. Johnson Joints are also available in pipe-supported and rod-supported types, to suit all operating needs.

The Johnson Corporation

845 Wood St., Three Rivers, Mich.



ONLY STEIN HALL OFFERS THIS COMPLETE SELECTION OF COLLOIDS

FOR YOUR PAPER MILL NEEDS

Stein Hall's world-wide resources of all the major natural colloids guarantees you a completely unbiased choice for your paper mill needs.

To help guide you in your selection, Stein Hall can put at your disposal the complete facilities of a highly experienced sales-service department. These facilities can help guide you to the particular product for your particular need. No matter how specialized your individual requirements, a Stein Hall product can be adapted to your needs.

Whether you make the selection yourself or take advantage of our offer of assistance, you have a freedom of choice unavailable anywhere else.

For samples or further information, write the Paper Mills Department PI-66

STEIN SH HALL
285 MADISON AVENUE NEW YORK 17, N. Y.
ESTABLISHED 1866

MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

The following are quotations to mills, f.o.b. New York: per cwt.

No. 1 White Shirt Cuttings	14.50 to 15.50
New Unbleached Muslins. .	16.50 to 17.00
Fancy Shirt Cuttings ...	5.50 to 6.00
No. 1 Percales	6.50 to 7.00
No. 1 Washables	2.60 to 2.75
No. 1 Light Silesias	7.50 to 8.00
No. 1 Light Prints	5.25 to 5.50
Light Flannelettes	7.50 to 8.00
Cottonades	3.75 to 4.00
Blue Overalls	8.00 to 8.50
Blue Cheviots	8.00 to 8.50
Canton Flannels, Bleached	11.50 to 12.00
Canton Flannels, Unbleached	11.50 to 12.00
Osnaburg Cuttings	11.00 to 11.50
Underwear Cuttings, Bleached	15.50 to 16.50
Underwear Cuttings, Unbleached	15.50 to 16.50
Khaki Cuttings—	
Sun Tan	6.00 to 6.50
Mixed	3.75 to 4.00
Linen Cuttings—	
American	7.50 to 8.00
White	12.00 to 13.00
Grey	12.00 to 13.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

Roofing	Per cwt.
No. 1	1.35 to 1.45
No. 2	1.25 to 1.35
No. 3 and 4	.95 to 1.05
Twos and Blues—	
Repacked	2.75 to 3.00
Thirds and Blues—	
Repacked	2.50 to 2.75
Miscellaneous	2.15 to 2.35
Whites, No. 1—	
Repacked	4.25 to 4.50
Miscellaneous	3.50 to 3.75
Whites, No. 2—	
Repacked	3.25 to 3.50
Miscellaneous	2.75 to 3.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

per cwt.

Nominal

New Dark Cuttings.....
New Mixed Cuttings.....
New Light Silesias.....
Light Flannelettes.....
Unbleached Cuttings.....
New White Cuttings.....
New Light Oxfords.....
New Light Prints.....

RAGS (Foreign)

ex dock New York City

OLD RAGS

per cwt.

Nominal

No. 1 White Linens.....
No. 2 White Linens.....
No. 3 White Linens.....
No. 4 White Linens.....
No. 1 White Cottons.....
No. 2 White Cottons.....
No. 3 White Cottons.....
No. 4 White Cottons.....
Extra Light Prints.....
Ord. Light Prints.....
Med. Light Prints.....
Dutch Blue Cottons.....
French Blue Cottons.....
French Blue Linens.....
Checks and Blues.....
Linsey Garments.....
Dark Cottons .....
Old Shopperies .....

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	5.50 to 6.00
Domestic	5.50 to 6.00
Wool Tares—	
Light	5.50 to 6.00
Heavy	5.75 to 6.25
No. 1 Scrap Bagging .	4.75 to 5.25
Manila Rope—	
No. 1 large, dom.	8.00 to 8.50
No. 1 small	7.00 to 7.50
Sisal Rope—	
No. 1 large	6.00 to 6.50
No. 1 small	5.50 to 6.00
New Burlap Cuttings....	5.75 to 6.25
Jute Threads—	
Foreign (Nom.).....	6.00 to 6.25
Domestic	6.25 to 6.50
Strings—	
No. 1 sisal.....	4.75 to 5.00
No. 2 sisal.....	4.25 to 4.50
Soft jute.....	4.75 to 5.00
Mixed	2.00 to 2.25

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts.	130.00 to 135.00
Hard White No. 1 ..	105.00 to 110.00
Soft White, one-cut ..	90.00 to 95.00
Soft White, No. 1 ..	75.00 to 80.00
Fly Leaf No. 1	40.00 to 45.00
Fly Leaf, Woody No. 1	40.00 to 45.00
No. 2 Mixed Cnl. Woody	35.00 to 40.00
Flat Stock—	
No. 1 Heavy Books and Magazines Repacked .	36.00 to 38.00
Mixed Books	26.00 to 28.00
Ledger Stock—	
No. 1 White	65.00 to 70.00
No. 1 Mixed (Colored)	42.50 to 47.50
Manilas—	
New Env. Cuttings ..	85.00 to 90.00
New Cuts, One-Cut—	
Extra Manilas	21.00 to 22.00
Manila Tab Cards, Free of Ground Wood	90.00 to 95.00
Colored Tab Cards ...	70.00 to 75.00
Kraft—	
New Envelope Cuttings	85.00 to 90.00
Tripled Buried No. 1 100%	45.00 to 50.00
No. 1 Old Assorted ..	32.50 to 37.50
News—	
White Blank	85.00 to 90.00
Overissue	27.00—
No. 1 Folded	21.00—
Old Corrugated Containers	24.00—
New Jute Corrugated Cuts	31.00—
Mill Wrappers	24.00—
Box Board Chips	16.00—
No. 1 Mixed Paper ...	14.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	5.05 to 5.20
Ground, cwt.	4.30 to 4.75
Powdered, cwt.	5.20 to 5.40
Blanc Fixe—	
Pulp, bulk, ton ....110.00—	
Dry, barrels .....115.00—	
Bleaching Powder—	
Drums, cwt	5.02 to 6.50
Casein (Domestic Standard) 20-30 mesh (bags), lb. 80-100 mesh (bags), lb.	30.00 to 31.00
Argentine, lb.	22.50 to 23.50
China Clay—	
Domestic Filler Bulk (mine) ton ...	10.00 to 19.00
Domestic Coating Bulk (mine) ton....	17.00 to 25.00
Imported (ship side) Bulk (lump) ton...	20.00 to 30.00
Chlorine—	
Tank cars (wks) cwt...	3.05—
Gelatine (silicon), lb. ...	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.30½ to .31
Litharge. Powd. bbl. ...	.17½ to .18
Resin (Gum)—	New York, per 100 lbs.
E	9.25—
F	9.25—
G	9.25—
WW	9.60—
Rosin (Wood), carlots, F.O.B. South	6.50—
Salt Cake—	
Dom. bulk (wks) ton	28.00 to 29.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	22.00—
Soda Ash—	
Bulk (works) cwt. ...	1.45 to 1.50
Paper bags, cwt.....	1.80—
Soda (Caustic)—	
Solid, drums, cwt. ...	4.10 to 4.85
Ground and flake, drums, cwt.	4.50 to 5.25
Sodium Silicate—	
60 deg. 55 gal. drums, (works) cwt.....	1.60 to 1.70
40 deg. 35 gal. drums, (works), cwt.....	1.35 to 1.40
Starch—	
Pearl, 140 lb. bags, cwt.	6.39—
Pearl, barrels, cwt. ..	6.39—
Paper (Sq.) bags, cwt.	6.39—
Powdered, barrels, cwt.	6.60—
Sulphur (Crude) (Mine) bulk, long ton	26.50 to 28.00
Talc—	
Dom. 100 lb. bags (mine) ton	26.00 to 30.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig. bbls., lb.	.24½ to .26½
Calcium Pig. bbls., lb.	.24½ to .26½
Zinc Oxide, bags	14.50 to 15.50

WOOD PULP

Quotations on domestic and Canadian wood pulp, dollars per short air dry ton, delivered consuming mills including basic freight allowances, follows:

Bleached Sulphite .....150.00—	
Bleached Sulphite, Canadian .....150.00—	
Unbleached Sulphite ...130.00—	
Unbleached Sulphite, Canadian .....130.00—	
Bleached Soda .....145.00—	
Bleached Soda, Canadian.145.00—	
Kraft Bleached .....152.00 to 155.00	
Kraft, Bleach., Hardwood .....150.00—	
Kraft, Bleach., Southern.155.00—	
Kraft, Bleach., Canadian.155.00—	
Kraft, Unbleached, Northern .....130.00—	
Kraft, Unbleached, Southern .....117.50 to 122.50	
Kraft, Unbleached, Canadian .....120.00 to 130.00	
Kraft, Semi-Bleached, Southern .....140.00—	
Sulphite Screenings .... 72.50—	
Sulphate Screenings .... 67.50—	
Groundwood ..... 80.00 to 85.00	

Quotations on imported wood pulp, dollars per short ton, on dock American Atlantic ports with varying freight allowances, follow:

Bleached Sulphite, Swedish, freight allowed .150.00—	
Bleached Sulphite, Norwegian, freight allowed.145.00—	
Bleached Sulphite, Finnish, freight allowed.150.00—	
Unbleached Sulphite, Swedish, freight allowed .130.00—	
Unbleached Sulphite, Finnish, freight allowed .130.00—	
Kraft, Unbleached, Swedish, freight allowed..125.00—	
Kraft, Unbleached, Finnish, freight allowed 125.00 to 150.00	
Kraft, Bleached, Swedish, on deck....155.00—	
Kraft, Bleached, Norwegian .....155.00—	

PAPER

Quotations are mill quotations New York City

Boards—

Prices per ton, delivered in New York, 10 tons or more:

Plain chip .....100.00—	
News vat lined chip ..105.00—	
.009 chip, rolls .....100.00—	
Filled news .....100.00—	
Solid news .....105.00—	
White vat lined chip...135.00—	
Chip tube and can stock.120.00—	
Single manila lined chip.150.00—	
Single jute lined chip..135.00—	
Container, 42 lb. .....127.50—	
Kraft liner .....130.00 to 140.00	

White patent coated:

.020 .....175.00—	
.018 .....177.50—	
.016 .....180.00—	

Book Paper f.o.b. New York— per cwt.

Machine coated, two sides

70 lb. No. 2 enamel; 25 x 4 cases	$17.75
38-500, trimmed 4 sides. Carloads	$16.80
45 lb. enamel, 25x38-500, 4 cases	$13.55
trimmed 4 sides ..... Carloads	$12.60

Uncoated

55 lb. No. 2 offset, 25x38 4 cases	$15.30
500, trimmed 4 sides ....Carloads	$14.35
50 lb. A Grade English Finish, 25x38-500, un 4 cases	$14.55
trimmed ..... Carloads	$13.60
20 lb. envelope, 17x22-500, untrimmed ..... Carloads	$12.90
16 lb. tablet, 17x22-500 ..... Carloads	$11.85

Rag Content Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

100% rag.....	59.80—
75% rag.....	45.45—
50% rag.....	36.20—
25% rag.....	29.70—

Rag Content Ledger—

(White, 5,000 to 10,000 lbs.)

100% rag.....	59.80—
75% rag.....	45.45—
50% rag.....	36.20—
25% rag.....	29.70—

Sulphite Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

No. 1.....	21.00—
No. 2.....	20.75—
No. 4.....	18.25—

Sulphite Ledger—

(White, 5,000 to 10,000 lbs.)

No. 1.....	21.50—
No. 2.....	20.50—
No. 4.....	19.00—

News delivered in New York— per ton

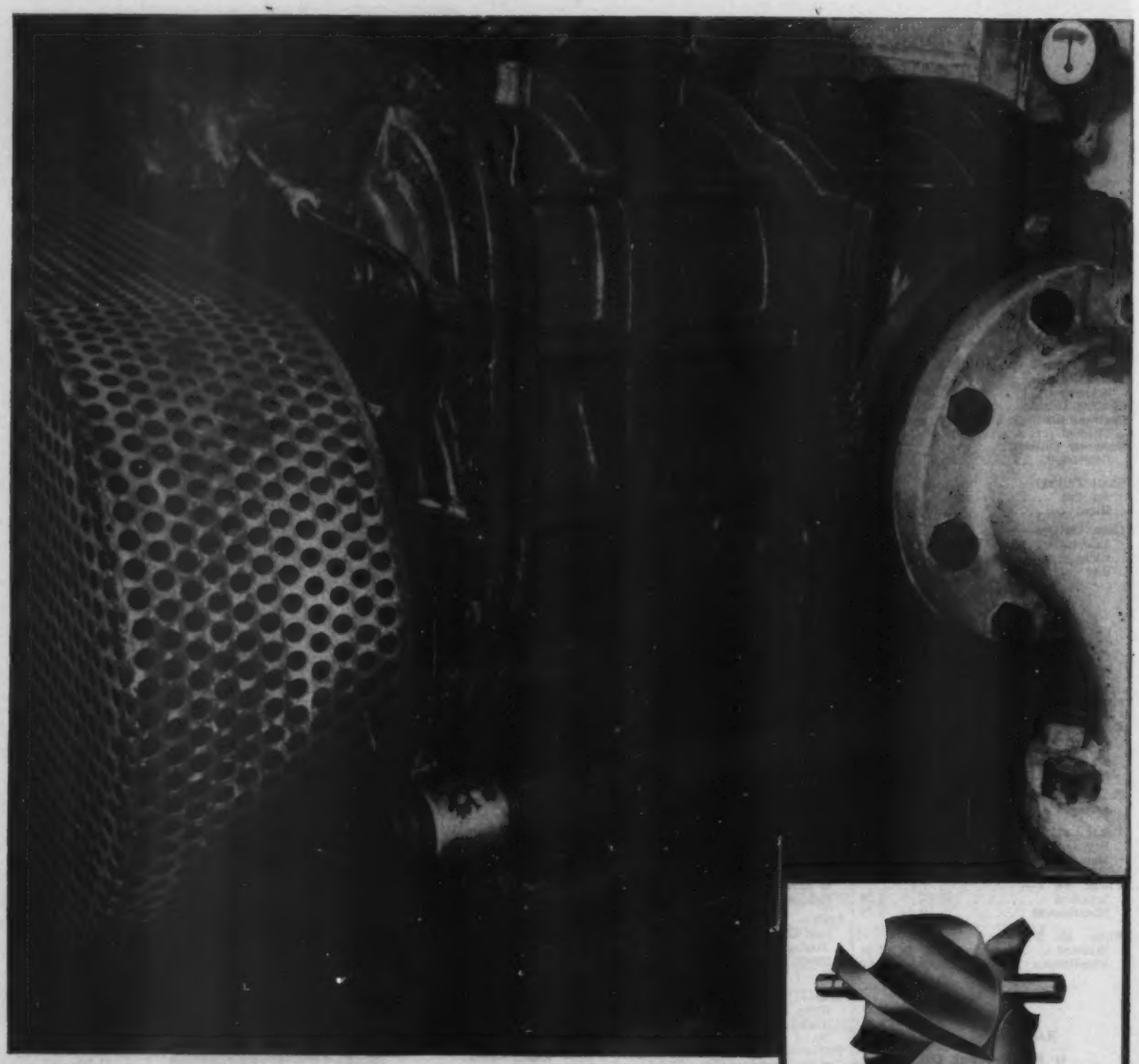
Rolls, Standard (Contract)	129.00 to 132.00
Rolls (Spot)	(Nominal)
Sheets	140.00—

Tissues (Carlots) f.o.b. New York—

	per ream
White No. 1	2.20—
White No. 2	1.90—
Bleached Anti-Tarnish ..	2.40—
Colored	2.20—
Anti-Tarnish Kraft ..	1.85—
Manila	2.20—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	1.00—
Napkins, full crepe and embossed (12½ lb. to Mshts.) per cs. ..	1.00—
Toilet, Bleached (M shts.) per cs. ..	9.50—
Toilet, Unbleached (M shts.) per cs. ..	8.00—

Wrappings (Kraft) f.o.b. New York— (Basis 50 lb. & heavier) per cwt.

Standard wrapping	8.50—
Butchers, counter rolls..	8.75—
Standard bag, mill rolls.	8.00—
Shipping sack, mill rolls.	8.25—
Gumming, mill rolls....	8.50—
Asphalting, mill rolls...	8.25—
Envelope, mill rolls....	9.75—



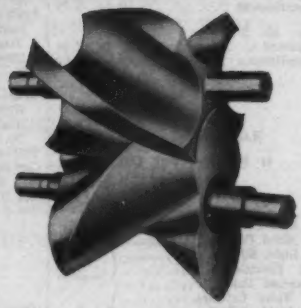
Standardaire pump solves drying and foaming problems . . . cuts maintenance for specialty paper producer

Uneven drying and heavy foaming problems resulting from vacuum fluctuations presented serious obstacles to Raybestos-Manhattan, Inc., in the production of its new, single-fiber asbestos paper.

A Standardaire vacuum pump, installed originally on a 4-month trial basis, entirely eliminated these difficulties. The unit, requiring only half of the area of the former pump, provided a constant vacuum, making possible an uninterrupted flow between the pulp vat and the final windup drum.

Now, after nearly four years of operation, often in excess of rated capacity, this unit still is in prime condition. No maintenance has been required other than lubrication at 3-month intervals.

The compact Standardaire offers greater capacity per pound of pump, with less power consumption, than other units of equal size and weight. Find out how they can help solve your problems. Write for your copy of illustrated bulletin B-154 which provides specifications and operating data.



The Standardaire's even vacuum and high capacity are the result of its exclusive cycloidal, screw-type rotors which compress air in a wide range of pressures with a minimum of internal leakage. Since rotors never touch, there is no friction, no wear or need for internal lubrication.

READ STANDARD
CORPORATION

BLOWER-STOKER DIVISION
370 Lexington Avenue
New York 17, New York

PUT ACTION IN YOUR SAFETY PROGRAM

Add a touch of showmanship to your safety program. Films let you tell your training story with the dramatic impact of pictures . . . action . . . sound. You can cut your safety training in half, give fewer refresher courses and get better results by using training films.

Here are three film sets that will help you arouse and keep alive interest in your safety program. And there is no better way to teach foremen how to be better supervisors.

SPEAKING OF SAFETY

A brand new set of films that will teach your foremen and supervisors the tips they should know about making safety talks, and how to transmit management's ideas and plans. Six 35mm sound slidefilms and leader's manual in an attractive leatherette case.

HUMAN FACTORS IN SAFETY

This is a series of six 35mm sound slidefilms with leader's manual that may be used for an advanced safety course. Each film deals with one aspect of the complex art of handling people. Collectively, the films show how to train workers, how to keep experienced people on their toes and how to win respect, cooperation and loyal support.

SAFETY MANAGEMENT FOR FOREMEN

A set of ten 35mm sound slidefilms—all that is needed for a course in safety fundamentals. The films explain how to organize a safety program, what part the foreman plays in the program and how safety increases production. They also discuss specific safety activities, such as machine guarding, safety inspections, the first aid program, etc. Complete with leader's manual in an attractive leatherette case.

Write for complete information and details to the

NATIONAL SAFETY COUNCIL

425 North Michigan Ave., Chicago 11, Illinois

Index to Advertisers

When writing them, please mention The PAPER INDUSTRY.

Refer to the Paper and Pulp Mill Catalogue and Engineering Handbook at your mill office for complete listing of all advertisers' products.

ACF Valves
Aerovent Fan Company, Inc. 248
American Cast Iron Pipe Co. 205
American Cyanamid Co. 204
American Defibrator, Inc.
Anheuser-Busch, Inc.
Annin Company, The 199
Antara Chemicals Division
Appleton Machine Co., The 210
Appleton Wire Works, Inc.
Appleton Woolen Mills 250
Armstrong Machine Works
Arnold, Hoffman & Co., Inc. 247
Askania Regulator Company
Associated Industrial Consultants 229
Asten-Hill Mfg. Co. 2nd Cover
Atkins Saw Division 196
Aurora Pump Division

Babcock & Wilcox Co., Tubular Products Division 200
Barco Manufacturing Co.
Barrell Co., William L.
Bauer Bros. Co., The
Beloit Iron Works
Black-Clawson Company, The
Bowsher Co., The N. P. 262
Burtonite Company, The

Cameron Machine Co. 235
Carthage Machine Co. 255
Chain Belt Company 201-202
Chemipulp Process Inc. 238
Chicago Bridge & Iron Company 194
Classified Advertising 262, 263
Clinton Corn Processing Co. 188
Cooper Alloy Corporation
Corn Products Refining Co. 198
Crane Packing Company
Crawford Fitting Company 245
Curtiss-Wright Corporation 239

Darling & Company 3rd Cover
Draper Brothers Company 209

Eastwood-Nealley Corporation
Egan & Company, Frank W. 208
Electric Eye Equipment Company
English China Clays Sales Corp. 262

Falk Corporation, The
Fischer & Porter Company
Fisher Governor Co. 185
Fritz Publications, Inc. 257, 258, 261

General Chemical Division
General Dyestuff Company
Gilbert & Nash Company
Goslin-Birmingham Mfg. Co.
Graton & Knight Company 242

Hanchett Manufacturing Co.
Hercules Powder Company
Hubinger Company, The
Hudson-Sharp Machine Company 244
Humphrey Elevator Company
Huyck & Sons, F. C. 203

Improved Machinery, Inc. 207
Ingersoll-Rand

Jackson & Church Company
Jenssen Company Inc., G. D.
Johnson Corporation, The 263
Josam Manufacturing Company

Kalamazoo Tank & Silo Co. 257
Kelco Company 4th Cover
Koppers Company, Inc. 197

Langston Co., Samuel M.
Layne & Bowler, Inc.
Lindsay Wire Weaving Co., The
Link-Belt Company 195
Lockport Felt Company
Lodding Engineering Corp. 254, 259

Magnuson Products Corp.
Master Builders Co., The 244
Mead Pulp Sales, Inc.
Midvale-Heppenstall Co., The 228
Minerals & Chemicals Corp. of America
Morden Machine Company
Morningstar, Nicol, Inc.
Murray Mfg. Co., D. J.

Nash Engineering Co., The 243
National Aluminate Corp. 186
National Aniline Division
National Safety Council 267
Naylor Pipe Company
Nichols Engr. & Research Corp.
Northern Engineering Works 241
Northwest Engineering Company 206
Norton Company

Oldbury Electro-Chemical Company

Paper and Pulp Mill Catalogue 258
Paper Industry, The 257, 261
Penick & Ford, Ltd., Inc.
Photovolt Corporation 263
Powell Valves 190
Preload Company, Inc., The
Pusey & Jones Corp., The

Raymond Service, Inc., Chas. P. 263
Read Standard Corporation 266
Red-Ray Mfg. Co., Inc.
Roots-Connersville Blower Division 246
Ross Engineering Corp., J. O. 193
Ross Midwest Fulton Corp. 240
Ross Paper Machinery Company 262

Seamlex Company, Inc. 248
Semet-Solvay Petrochemical Division
Shuler & Benninghofen 260
Signode Steel Strapping Company 233
Smidth & Co., F. L.
Smith & Serrell, Inc. 255
Stadler, Hurter & Company 257
Staley Mfg. Co., A. E.
Standard Oil Co. (Indiana)
Stein, Hall & Company 264
Stickle Steam Specialties Co.
Sutherland Refiner Corp.
Swenson Evaporator Company 1st Cover

Taylor-Wharton Division
Testing Machines, Inc. 249
Texas Gulf Sulphur Co.

United States Movidyn Corp. 236

Valley Iron Works Company
Vapo Systems Co., Inc. 242

W-K-M Manufacturing Co., Inc.
Weyerhaeuser Timber Co. 226
Whiting Corporation 1st Cover
Williams-Gray Company
Wisconsin Wire Works

Yarnall-Waring Company
Youngstown Welding & Engineering Company, The 256

Professional & Business Service Section
Sirrine Company, J. E. 262

PAPER INDUSTRY Whither?

..... In production, processes, new products, markets

New output records

Paper and board output for the first quarter of 1956 amounted to 8,045,000 tons, an increase of 4.5 per cent over that of the corresponding period in 1955. Total 1956 output is expected to be between 31,000,000 and 32,000,000 tons. The United States industry has spent 3.5 billion dollars on new mills and modernization since the end of World War II.

Increasing newsprint demand

Indications of increased newspaper advertising and of new circulation patterns in the newspaper field seem to point to a U. S. need for some 9,500,000 tons of newsprint by 1960.

Delayed-tack and heat-seal resins

Polyamide resins are now available that show "delayed-tack" properties. The adhesive polyamide film, after activation with heat, remains tacky for a long enough period after the film has cooled to room temperature to permit "delayed heat sealing" of the bond at some later operation and in the absence of heat.

Hydrogen peroxide and hypochlorite single-stage bleach

A combined hydrogen peroxide and calcium hypochlorite single-stage bleach (i.e., without intermediate washing) of sulfite pulp resulted in a whiter and mechanically stronger pulp than can be obtained from a single-stage hypochlorite bleach alone.

The experimental method consisted of bleaching sulfite pulp with hypochlorite at 42°-44° C. (108°-111°F.) for an hour and a half when all the active chlorine was consumed. Hydrogen peroxide was then added, without first washing the pulp, and then bleached to the required degree of brightness.

Polyethylene-wax blends

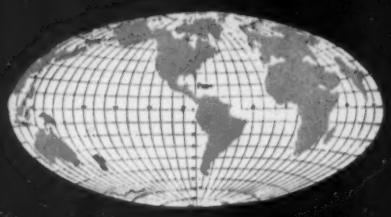
Microcrystalline type waxes, made from synthetic gas and found to be compatible with polyethylene in all proportions, impart added rigidity to polyethylene while improving polyethylene's transmission properties to some gases and vapors.

Cost of chemical debarking of oak

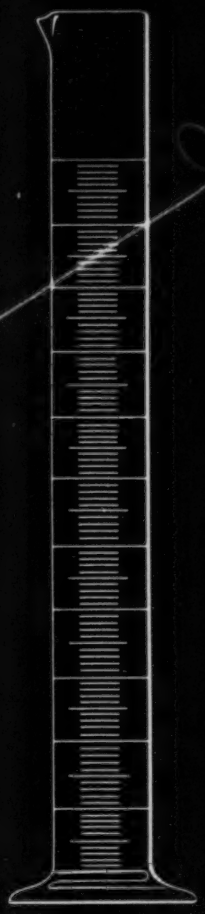
The cost of chemical debarking of oak, computed on the basis of 1352 trees totaling 103.5 rough cords, was found to be $1.73 per cord.

U. S. water needs

U. S. water needs are expected to increase from the present 262 billion gal. per day to 453 billion gal. by 1975. The Defense Services Administration claims that it is economically possible to provide, through storage and regulated release, a constant daily supply of 630 billion gal. of fresh water.



HERE IS THE WORLD'S SMALLEST



SAVE

You'll find this miniature saveall at work in DARLING'S testing laboratory. Small as it is, it duplicates actual saveall conditions. Flocculating efficiency and clarity of effluent can be determined for a wide range of conditions . . . comparing results obtained with different glue solutions in combination with various white waters.

This device is one of many testing tools which DARLING uses in improving its product and its service.

The best place to test DARLING GLUES, of course, is in *your* saveall because—

In the great majority of cases, one of DARLING'S specifically-formulated GLUES will reduce costs while maintaining or improving recovery efficiency.

We'd like to work with you in making just such a test in your mill. The entire cost is on us. You've nothing to lose . . . plenty to gain. You can make arrangements through your DARLING SALES REPRESENTATIVE.
Or write or call us collect.

DARLING'S improved BONE GLUE

DARLING & COMPANY
GLUE DIVISION
4201 South Ashland Avenue • Chicago, Illinois

HOW TO PRODUCE HIGH GLOSS MOTTLE-FREE PRINTING AT SUBSTANTIALLY REDUCED INK COSTS

Important developments in paper surface sizing!

When applied to your sheet at size press or calender stack, these versatile colloids develop surfaces of exceptional smoothness and uniform density on all grades of paper and board.

Ink films bond quickly and completely. Ink vehicle penetration is precisely controlled to produce brilliant, mottle-free Super Gloss and High Gloss printing. Substantial ink savings are effected.

Kelgin XL and Kelgin LV are non-tacky. They provide smooth, trouble-free operation on the machine. Surprisingly economical, too, for such quality.

If you have a gloss-ink printing problem, do call or write your nearest Kelco regional office. A trained technical man is at your service, without obligation.

KELGIN XL KELGIN LV

KELCO

20 N. Wacker Drive, Chicago 6, Illinois

120 Broadway, New York 5, N. Y.
Cable Address: Kelcoalgin — New York

530 West Sixth Street, Los Angeles 14, Calif.